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FOOD TECHNOLOGY ABSTRACTS

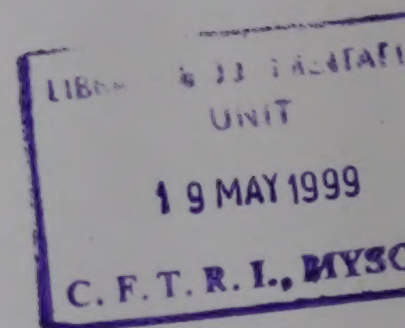


Central Food Technological Research Institute, Mysore
National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi

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FOOD TECHNOLOGY ABSTRACTS

Vol. 34 No. 1
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213

National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Compiled & Edited by

B. Vasu

C. S. Anita

Abstractors to FTA

AA Author's Abstract

BV B. Vasu

CRG C. R. Goud

CSA C. S. Anita

GS Geetha Seetharam

SD S. Dhanaraj

SRA S. R. Ananthnarayan

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

Production

S. Umesh

P. S. Ganesh Prasad

C. N. Janardhan

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ABBREVIATIONS

| | |
|----------------|-------------------------------------------------------|
| A | ampere |
| AAS | atomic absorption spectrometry |
| ADP | adenosine diphosphate |
| Anon. | Anonymous |
| AOAC | Association of Official Analytical Chemists |
| approx. | approximately |
| atm | atmosphere |
| ATP | adenosine triphosphate |
| a _w | water activity |
| BHA | butylated hydroxyanisole |
| BHT | butylated hydroxytoluene |
| b.p. | boiling point |
| Btu | British thermal unit |
| c- | centi- [as in cm, cm ² , cm ³] |
| cal | calorie |
| cd | candela |
| °C | degree centigrade |
| Cl | curie |
| CMC | carboxymethyl cellulose |
| coeff. | coefficient |
| conc. | concentrated |
| concn. | concentration |
| cv. | cultivar |
| cwt | hundredweight |
| d- | deci- |
| DE | dextrose equivalent |
| detn. | determination |
| DFD | dark firm dry |
| diam. | diameter |
| dil. | dilute |
| DM | dry matter |
| DNA | deoxyribonucleic acid(s) |
| dyn | dyne |
| E. | East, Eastern, etc |
| ECD. | electron capture detection |
| EDTA | ethylenediaminetetraacetic acid |
| Eh | oxidation-reduction potential |
| ELISA | enzyme-linked immunosorbent assay |
| f- | femto-[10 ⁻¹⁵ , as in fCi] |
| °F | degree Fahrenheit |
| FAO | Food and Agricultural Organization |
| FDA | Food and Drug Administration |
| FID | flame ionization detection |
| fl oz | fluid ounce |
| f.p. | freezing point |
| ft | foot, feet |
| g | gram |
| GC | gas chromatography |

| | |
|---------|-------------------------------------------------|
| gr | gravity |
| gal | gallon |
| gf | gram-force |
| GLC | gas-liquid chromatography |
| h | hour |
| ha | hectare |
| HDPE | high density polyethylene |
| hl | hectolitre [100 l] |
| hp | horse power |
| HPLC | high performance/pressure liquid chromatography |
| HTST | high temperature short time |
| Hz | hertz [frequency cycles/s] |
| in | inch |
| IR | infrared |
| IU | International unit |
| J | joule |
| k- | kilo- [as in kcal, kg] |
| K | Kelvin |
| l | litre |
| lb | pound |
| lbf | pound-force |
| LDPE | low density polyethylene |
| m- | milli- [as in mg, ml, mm] |
| m- | equimilli-equivalent |
| M | molar concentration |
| M- | mega- [as in Mrad] |
| max. | maximum |
| min | minute [time] |
| min. | minimum |
| mol | mole |
| mol.wt. | molecular weight |
| m.p. | melting point |
| MPN | most probable number |
| MS | mass-spectrometry |
| n- | nano-[10 ⁻⁹ , as in nm] |
| N | Newton [kg m/s ²] |
| N. | North, Northern, etc |
| N | Normal concentration |
| NMR | nuclear magnetic resonance |
| NPU | net protein utilization |
| oz | ounce |
| p- | pico- [10 ⁻¹² , as in pCi] |
| P | Poise |
| p | probability |
| Pa | pascal (N/M ²) |
| PAGE | polyacrylamide gel electrophoresis |
| PER | protein efficiency ratio |
| p.p.b. | parts per billion |
| p.p.m. | parts per million |
| PSE | pale soft exudative |
| PTFE | polytetrafluorethylene |
| PVC | polyvinyl chloride |
| PVDC | polyvinylidene chloride |

| | |
|-----------|-----------------------------------------|
| qt | quart |
| R | rontgen |
| rad | rad or radian |
| ref. | reference(s) |
| rev/min | revolutions per minute |
| RH | relative humidity |
| RNA | ribonucleic acid(s) |
| S. | South, Southern, etc. |
| s.d. | standard deviation |
| SDS | sodium dodecylsulphate |
| s.e. | standard error |
| s | second [time] |
| SNF | solids-not-fat |
| sp., spp. | species |
| sp.gr. | specific gravity |
| summ. | summary |
| Suppl. | Supplement |
| t | metric tonne |
| temp. | temperature |
| TLC | thin layer chromatography |
| TS | total solids |
| UHT | ultra-high temperature |
| UV | ultraviolet |
| V | volt |
| var. | variety |
| vol. | volume |
| v/v | volume/volume |
| W | watt |
| W. | West, Western, etc. |
| WHO | World Health Organization |
| w/v | weight/volume |
| wk | week |
| wt. | weight |
| yd | yard |
| yr | year |
| μ | micro-[as in g, μm] |
| % | per centum |
| > | greater than |
| ≥ | greater than or equal to; not less than |
| < | less than |
| ≤ | less than or equal to; not greater than |

ABBREVIATIONS FOR LANGUAGES

| Language of text | |
|------------------|----|
| Dutch | Nl |
| French | Fr |
| German | De |
| Italian | It |
| Japanese | Ja |
| Norwegian | No |
| Spanish | E |
| Swedish | Sv |

JOURNALS SCANNED FOR FTA

| | |
|------------------------------------------------------------|-----------------------------------------------|
| Activities Report of the R & D Associates | Food Chemistry |
| Agricultural Situation in India | Food Control |
| Andhra Agricultural Journal | Food Engineering |
| Applied and Environmental Microbiology | Food Engineering International |
| Applied Microbiology and Biotechnology | Food Hydrocolloids |
| Appropriate Technology | Food in Canada |
| Bangladesh Journal of Scientific and Industrial Research | Food Manufacture |
| Beverage and Food World | Food Microbiology |
| Bioscience, Biotechnology and Biochemistry | Food Microstructure |
| Biotechnology | Food Processing |
| Biotechnology Advances | Food Production/Management |
| Biotechnology and Bioengineering | Food Quality and Preference |
| Biotechnology Letters | Food Research International |
| Biotechnology Progress | Food Reviews International |
| British Journal of Nutrition | Food Science and Nutrition |
| Bulletin of Grain Technology | Food Science and Technology Today |
| Canadian Journal of Animal Science | Foodtech Quarterly |
| Cereal Chemistry | Food Technology |
| Cereal Foods World | Food Technology in New Zealand |
| Chemical Senses | Food Trade Review |
| Chemie Mikrobiologie Technologie der Lebensmittel (German) | Fruits |
| Chemistry and Industry | Gétreide-Mehl und Brot |
| Coffee & Cocoa International | Gordian |
| Confectionery Production | Grasas y Aceites |
| Confructa (German) | Hortscience |
| Critical Reviews in Biotechnology | Indian Arecanut, Spices and Cocoa Journal |
| Critical Reviews in Food Science and Nutrition | Indian Cashew Journal |
| Critical Reviews in Microbiology | Indian Coconut Journal |
| Critical Reviews in Toxicology | Indian Coffee |
| Cuban Journal of Agricultural Science | Indian Dairyman |
| Current Science | Indian Farming |
| Deutsche Lebensmittel-Rundschau | Indian Food Industry |
| Die Nahrung | Indian Food Packer |
| Economic Botany | Indian Horticulture |
| Fett Wissenschaft Technologie (German) | Indian Journal of Agricultural Economics |
| Fishery Technology | Indian Journal of Agricultural Sciences |
| Flavour and Fragrance Journal | Indian Journal of Animal Research |
| Food | Indian Journal of Animal Science |
| Food Additives and Contaminants | Indian Journal of Biochemistry and Biophysics |
| Food and Chemical Toxicology | Indian Journal of Dairy Science |
| Food and Nutrition Bulletin | Indian Journal of Environmental Health |
| Food Australia | Indian Journal of Experimental Biology |
| Food Biotechnology | Indian Journal of Fisheries |
| | Indian Journal of Horticulture |

Indian Journal of Medical Research
Indian Journal of Medical Science
Indian Journal of Microbiology
Indian Journal of Nutrition and Dietetics
Indian Journal of Poultry Science
Indian Journal of Chemical Technology
Indian Miller
Indian Perfumer
Indian Spices
Indian Sugar
Industria Conserve (German)
Industrie Alimentari (Italian)
Industries Alimentaires et Agricoles (French)
INFORM
International Bottler and Packer
International Journal for Vitamin and Nutrition Research
International Journal of Animal Science
International Journal of Food Microbiology
International Journal of Food Science and Technology
International Journal of Food Science and Nutrition
International Journal of Refrigeration
International Pest Control
Invention Intelligence
Irish Journal of Food Science and Technology
Italian Journal of Food Science
Japan Pesticide Information
JARQ (Japan Agricultural Research Quarterly)
Journal of Agricultural and Food Chemistry
Journal of Animal Science
Journal of AOAC International
Journal of Biosciences
Journal of Cereal Science
Journal of Chemical Technology and Biotechnology
Journal of Coffee Research
Journal of Dairy Research
Journal of Dairy Science
Journal of Economic Entomology
Journal of Fermentation and Biotechnology
Journal of Food Biochemistry
Journal of Food Engineering
Journal of Food Process Engineering
Journal of Food Processing Preservation
Journal of Food Protection
Journal of Food Quality
Journal of Food Safety

Journal of Food Science
Journal of Food Science and Technology (India)
Journal of General and Applied Microbiology
Journal of Lipid Research
Journal of Nutrition
Journal of Nutritional Biochemistry
Journal of Nutritional Science and Vitaminology
Journal of Plantation Crops
Journal of Root Crops
Journal of Scientific and Industrial Research
Journal of Sensory Studies
Journal of Stored Products Research
Journal of Texture Studies
Journal of the American Oil Chemist's Society
Journal of the American Society for Horticultural Science
Journal of the Indian Chemical Society
Journal of the Institute of Brewing
Journal of the Institution of Chemist's (India)
Journal of the National Science Council of Sri Lanka
Journal of the Oil Technologists Association of India
Journal of the Science of Food and Agriculture
Journal of the Society of Dairy Technology
Kenya Coffee
Khadigramodyog
Lebensmittel-Wissenschaft und - Technologie
Lipids
Lipid Technology
Madras Agricultural Journal
Manufacturing Confectioner
Meat Science
Mushroom Journal
Nature, UK
Netherlands Milk and Dairy Journal
New Scientist
Nutrition Reviews
Oils and Oilseeds Journal
Oleagineux (French)
Oryza
Packaging India
Packaging Japan
Paperboard Packaging
Perfumer and Flavourist
Pesticide Biochemistry and Physiology
Pesticide Science
Pesticides Information
Phytochemistry

PKV Research Journal

Plantation

Plant Foods for Human Nutrition

Plant Science

Poultry Guide

Poultry Science

Prepared Foods

Proceedings of the All India Sugar Technologists

Process Biochemistry

Processed Prepared Food

Progress in Lipid Research

Quick Frozen Foods International

Science and Culture

Science (USA)

Science Reporter

Sciences

Sciences Des Aliments (French/English)

Scientific American

Seafood Export Journal

Sri Lanka Journal of Tea Science

Standards India

Starch/Starke

Tea and Coffee Trade Journal

Technical Quarterly

Technology Review

Toxicology

Trends in Food Science and Technology

Tropical Science

Two and a bud

World Coffee and Tea

World's Poultry Science Journal

Zeitschrift Fuer Lebensmittel-Untersch und Forschung
(German)



GENERAL

1
Hollingsworth (P). **New rules for success in food research.** *Food Technology* 52(5); 1998; 76, 78, 79, 216

2
Brody (AL). **Minimally processed foods demand maximum research and education.** *Food Technology* 52(5); 1998; 62, 64, 66, 204, 206

The article stresses the need for greater research and education regarding minimally processed chilled-distribution foods and a multidisciplinary approach to go for it. CSA

FOOD PROCESSING

3
Benhura (MAN) and Chitsiku (IC). **The extractable β -carotene content of Guku (*Bidens pilosa*) leaves after cooking, drying and storage.** *International Journal of Food Science and Technology* 32(6); 1997; 495-500

4
Casolari (A). **Heat resistance of prions and food processing.** *Food Microbiology* 15(1); 1998; 59-63

The knowledge of heat inactivation kinetics of scrapie and Creutzfeldt-Jacob Disease (CJD) prions is incomplete and fragmentary. This occurs also because the inactivation kinetics of prions is not exponential. However, by the analysis of available data, it results that usual food processing parameters are largely unable to kill prions. The required prions lethality could be reached by changing the food processing technology. The aseptic process is the most promising alternative. AA

5
Ovadia (DZ) and Walker (CEC). **Impingement in food processing.** *Food Technology* 52(4); 1998; 46-50

Products that can be heated, cooled, dried or frozen by impingement which is a process of directing a jet

or jets of fluid such as air against the surface of food is discussed in this article. Impingement equipments, reduced moisture loss, microwaves and impingement, radiofrequency waves and impingement, and impingement freezing are also covered. CSA

FOOD PACKAGING

6
Kothari (AJ) and Kothari (RA). **Horizontally formed three-or four-side sealed pouches.** *Packaging India* 31(3); 1998; 73-75, 79

Uses, operations, film treading, forming, side sealing, cut-off, pouch transport mechanism aspects are described. SRA

7
Shah (A). **Current status and development needs for thermoform packaging machinery and system.** *Packaging India* 31(2); 1998; 43-45

Present status of the thermoformed packed products and machines, shrink wrapped products, packaging material (semi-automatic vacuum forming machine, sealing machine, trimming machine; automatic vacuum forming machine; disposable container making plant; thermoform-fill seal system; shrink wrapping machines), future growth, demand estimates, steps to promote-develop the demand, current technology status, existing gap in technology and how to get technology are discussed. SRA

8
Prabhakaran (P) and Narayanan (PV). **Barrier properties.** *Packaging India* 31(3); 1998; 35-40

Significance of barrier testing, the theory, units, test method-standards, standard test methods, ASTM D 1434, ASTM D 3985, ASTM 96, effects of environment (effect of temp., pressure and RH), methods used for permeability measurement are described. SRA

9
Narayanan (PV). **Machinery for packaging EU sector: A review.** *Packaging India* 31(2); 1998; 57

A brief review article. SRA

Das (CS). **Bag-in-box system (B-I-B). Packaging India** 31(2); 1998; 19

The bag-in-box (BIB) system is a bulk packaging system for liquids in quantities greater than 3 l upto 1000 l. The system finds application in varied food industries like wine, beverage syrup, aseptic fruit pulp and conc., dairy products, cooking oil and fat. The system consists of the following components: 1. A four-side sealed bag fitted with a spout-through which the product is filled and dispensed; 2. A rigid outer container-either a corrugated box, drum or crate; 3. A filling system which evacuates air from the bag and fills the liquid product volumetrically into the same. Benefits, factors impeding growth of BIB in India and growth drivers are discussed. SRA

11

Vasudeo (YB) and Rangaprasad (R). **Packaging and the consumer general aspects. Packaging India** 31(3); 1998; 9-12

In this article, some general aspects about packaging have been addressed from a consumers point of view. The changing face of retailing, consumer characteristics (subsistence buyers, discriminatory-buyers, the hedonists), the role of packaging designer, packaging and imagery, health, the role of graphic design in packaging and the importance of labels and labelling aspects are the topics included. SRA

FOOD ENGINEERING AND EQUIPMENT

12

Gogus (F), Wedzicha (BL) and Lamb (J). **Modelling of Maillard reaction during the drying of a model matrix. Journal of Food Engineering** 35(4); 1998; 445-458

The effect of reactants on the Maillard reaction of a gel matrix [microcrystalline cellulose (220 g kg^{-1}), agar (10 g kg^{-1}), glucose (9 g kg^{-1}), glycine (3.7 g kg^{-1})] during the dehydration in air at 80°C was studied. The moisture content, glucose, glycine and reaction product distributions were obtained in a cylindrical sample of gel matrix. It was found that the reaction products increased with increasing solute concn. Distribution data were used to develop a model describing the Maillard reaction in the gel

matrix as a function of solute concn. The model was in agreement with the experimental data. AA

13

Ren (G) and Chen (F). **Drying of American ginseng (*Panax quinquefolium*) roots by microwave-hot air combination. Journal of Food Engineering** 35(4); 1998; 433-443

American ginseng (*Panax quinquefolium*) roots were dried, respectively, with hot air and combined microwave-hot air methods in a modified experimental microwave oven. For hot air drying, the loading size, drying temp. and air flow rate were 100 g, 40°C and 60 l/min, resp. For combined microwave-hot air drying, the additional microwave power of 60 W was used. Drying time to achieve the desired moisture level (10%) in the final product, and the colour of the product, were used to evaluate the combined microwave-hot air drying and the conventional hot air drying methods. Combined microwave-hot air drying resulted in a substantial decrease (28.7-55.2%) in the drying time and had little influence on the colour of the final product. AA

14

Woinet (B), Andrieu (J), Laurent (M) and Min (SG). **Experimental and theoretical study of model food freezing: Part II. Characterization and modelling of the ice crystal size. Journal of Food Engineering** 35(4); 1998; 395-407

Frozen gelatin gels were freeze-dried, then sliced, microphotographed and analyzed with image analysis software. A mean ice crystal size was determined at different locations inside the gel for many operating conditions and different gelatin concn. with or without ionic solute (NaCl). It was observed that the mean ice crystal size grew proportionally with the distance from the cold plate. Ionic solute addition had a great influence on the mean ice crystal size. A model based on the principle of the supercooling resulting from the max. concn. difference in the interdendritic zone was able to justify the experimental relationship and to interpret quantitatively these data. AA

15

Woinet (B), Andrieu (J) and Laurent (M). **Experimental and theoretical study of model food freezing: Part I. Heat transfer modelling. Journal of Food Engineering** 35(4); 1998; 381-393

Textural or organoleptic quality of frozen foods is strongly related to freezing operating conditions which govern the ice crystal size. During this work, gelatin gel was used as a model food and was frozen in a freezing device which ensured a unidirectional heat transfer. The temp. profiles recorded inside the material determined the position of the initial freezing front vs. time and the initial freezing temp. Temp. profiles were obtained for several gelatin gel compositions, cooling temp. and initial temp. values. The heat transfer could be approx. fitted by the Neumann model. Relationships between gel composition and initial freezing temp. value were also discussed. AA

16

Krokida (MK), Karathanos (VT) and Maroulis (ZB). **Effect of freeze-drying conditions on shrinkage and porosity of dehydrated agricultural products.** *Journal of Food Engineering* 35(4); 1998; 369-380

Structural properties such as particle density, bulk (or apparent) density and porosity of apple, banana, carrot and potato were investigated after freeze-drying under various drying conditions. The materials were freeze-dried at various pressures, to achieve sample temp. ranging between -50 and -5°C. For temp. above the glass transition temp. of the concentrated amorphous solution ($T_g = -45^\circ\text{C}$), the freeze-dried materials decreased in size. The bulk density of the freeze-dried materials was increased with temp. and an exponential equation was used to express this influence. The final porosity decreased as the sample temp. increased for all the materials examined, ranging between 70 and 95%. The final porosity was related to the complex viscosity of frozen apple and potato which decreased linearly as the temp. increased in the temp. range examined. AA

17

Kang (JS) and Lee (DS). **A kinetic model for transpiration of fresh produce in a controlled atmosphere.** *Journal of Food Engineering* 35(1); 1998; 65-73

A simple transpiration model based on heat and mass balances between produce and storage atm. was developed and tested experimentally to predict moisture loss of fresh produce in normal air and in a controlled atm. The transpiring water transfer was

coupled to heat transfer at steady state. Sum of heat energies transferred through natural convection from ambient air and generated from respiration inside the produce was assumed to be supplied for evaporating moisture on the surface. Respiration heat was obtained from measured respiration rate of O_2 consumption and CO_2 production, and convective heat transfer was calculated from an empirical formula for natural convection, in which produce temp. was taken as wet bulb temp. The moisture losses estimated by the developed model were in good agreement with experimental data of wt. change for the apples and minimally processed vegetables stored under controlled atmospheric conditions and normal air. The model is advantageous since it is simple and requires only a small number of input variables, which are easily measurable. AA

18

Krokida (MK), Zogzas (NP) and Maroulis (ZB). **Modelling shrinkage and porosity during vacuum dehydration.** *International Journal of Food Science and Technology* 32(6); 1997; 445-458

Apparent density, true density, specific vol. and internal porosity were investigated during vacuum dehydration of banana, apple, carrot and potato, at various moisture contents and pressures. The pressure was found to effect significantly the apparent density and porosity of the materials examined, while for the true density, this effect was practically negligible. In all 4 materials the development of porosity was favoured by the decrease of pressure. At the lowest pressure used (30 mbars) banana and apple developed the highest porosity values (~75%), followed by those of carrot (~50%) and potato (~25%). A simple mathematical model was proposed to predict the above properties as functions of material moisture content and pressure. The parameters incorporated into the model were: the enclosed water density, the dry solids density, the apparent density of the dry material and a transformed vol.-shrinkage coefficient. Among these parameters, only the apparent density of the dry material was found to be strongly affected by the pressure and a suitable exponential equation was proposed to express this influence. The proposed model was fitted to the experimental data satisfactorily, and the required parameters were estimated through a regression analysis procedure. AA

19

Ranjan Sarkar. **Energy management in dairy and food processing industry.** *Indian Dairyman* 50(8); 1998; 21-22

Energy management system in a dairy and food processing industry should be geared to (i) save energy cost, (ii) identify and control inefficiencies in plants, machinery and process, for increased output/efficiency; and (iii) increase security of the energy supply. Based on sample survey energy saving potential assessed for liquid milk processing plants is 7-20% ; ice cream production 10-15%, cheese production 9-20%, chilled foods 10-30%, food storage plants 15-40% and brewery 10-25%. GS

FOOD CHEMISTRY AND ANALYSIS

20

Richardson (SD), Thruston (AD), Caughran (TV), Collette (TW), Patterson (KS), Lykins (BW). **Chemical by-products of chlorine and alternative disinfectants.** *Food Technology* 52(4); 1998; 58-61

The chemical by-products of chlorine treatment of food and drinking water are compared in this article to those of alternative disinfectants such as chlorine dioxide, ozone and chloramine. CSA

Chemistry

21

Moresi (M) and Sappino (F). **Economic feasibility study of citrate recovery by electrodialysis.** *Journal of Food Engineering* 35(1); 1998; 75-90

In this work, the optimal operating conditions (pH and current density) for citric acid recovery from aqueous solutions via electrodialysis (ED) were determined by balancing the investment and maintenance costs against the energy costs. By referring to a series of industrial-scale ED plants, the specific recovery costs (C_o) were found to be dependent on plant capacity (Q_p), current density (j) and specific costs of solute (C_s) and electric energy (C_{ee}). For a plant size of 2500 metric tons per yr., fed

with aqueous solutions containing 100 g/dm^3 of citric acid at pH ranging from 3 to 7, and for $C_{ee} = \text{Lit } 100/\text{kWh}$ and $C_s = \text{Lit } 2000/\text{kg}$, the ED recovery of mono-, di-, or tri-sodium citrates would cost Lit 1900/kg, Lit 774/kg, or Lit 565/kg, resp., thus showing that citric acid can be more economically separated from clarified fermentation broths by ED once converted into the tri-sodium salt. AA

22

Atanasova-Goranova (VK), Dimova (PI) and Pevicharova (GT). **Effect of food products on endogenous generation of N-nitrosamines in rats.** *British Journal of Nutrition* 78(2); 1997; 335-345

An experiment was conducted to study the efficacy of 2 tomato pastes and aronia nectar (fruit juice + pulp from the black chokeberry, *Aronia melanocarpa* Elliot) as inhibitors of nitrosamine production in cancer prophylaxis programmes. White male rats of the Wistar strain were employed in an acute trial. Aminopyrin + sodium nitrite (APSN) were used as precursors for generation of endogenous nitrosamine. The animals were allocated to different dietary groups and fed by intubation with APSN or APSN + food products. Introduction of tomato paste (TP), high- β -carotene tomato paste (HCTP) and aronia nectar (AN) as inhibitor's of N-nitrosamine formation exerted a positive effect on blood and liver variables which was demonstrated by decreased concn. of glutamic-oxaloacetic transaminase (EC 2.6.1.1), glutamic-pyruvic transaminase (EC 2.6.1.2) and uric acid in serum and lipid content in hepatocytes. Animals treated with APSN developed dystrophic changes in liver such as centrolobular necrosis, intense exangia, and enlarged cells with 2, often large, pyknotic nuclei, while the structure of livers of rats fed with TP, HCTP or AN was well protected and almost normal. TP had a particularly beneficial effect on serum total protein and albumin concn. as had AN on the urea value. The inhibitory effect of the food products used is explained by their chemical nature including pH, ascorbic index (asocorbate:nitrate), lycopene and β -carotene contents. AA

23

Rowe (DJ). **Aroma chemicals for savory flavours.** *Perfumer and Flavourist* 23(4); 1998; 9-16

In an attempt to discover more about people's perceptions of "savory", a number of people were

asked to complete a simple questionnaire assessing the suitability of 146 odour descriptors against the term "savory". According to the questionnaire, the 10 most appropriate descriptors, in the descending order, were the following: fried chicken, meaty (cooked), seasoning, garlic, onion, warm, black pepper, smoky, cheesy and kippery (smoked fish). From this it can be gleaned that the key notes are: fried, fatty and roasted notes, meaty aromas, "allium" odours-onion and garlic, spicy/smoky/cheesy notes. SRA

24

Lewicki (PP). **The applicability of the GAB model to food water sorption isotherms.** *International Journal of Food Science and Technology* 32(6); 1997; 553-557

The fitting ability of the GAB equation has been analysed. It has been shown that the GAB model describes well sigmoidal type isotherms when parameters are kept in the following regions: $0.24 < k$ less than or equal to 1 and 5.67 less than or equal to c less than or equal to infinity. Outside these regions the isotherm is either no longer sigmoidal or the monolayer capacity is estimated with the error larger than plus or minus 15.5%. Moreover, keeping constants in the above regions fulfills the requirements of the BET model. AA

25

Homma (S), Terasawa (N), Kubo (T), Yoneyama-Ishii (N), Aida (K), Fujimaki (M). **Changes in chemical properties of melanoidin by oxidation and reduction.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 533-535

26

Miyawaki (O), Saito (A), Matsuo (T) and Nakamura (K). **Activity and activity coefficient of water in aqueous solutions and their relationships with solution structure parameters.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 466-469

27

Lubbers (S), Landy (P) and Voilley (A). **Retention and release of aroma compounds in foods containing proteins.** *Food Technology* 52(5); 1998; 68, 70, 72, 74, 208, 210, 212, 214

The objective of this article is to give a general understanding of the behaviour of aroma molecules in systems containing proteins, especially those of animal origin. Factors affecting flavour binding such as protein nature and medium conditions, protein content, adsorption on solid substrate, pH, salts, solvent nature, temp. and aroma compounds are discussed. CSA

28

Paterson (LA), Hill (SE), Mitchell (JR) and Blanshard (JMV). **Sulphite and oxidative-reductive depolymerization reactions.** *Food Chemistry* 60(2); 1997; 143-147

Addition of sulphite at levels between 0.004 and 1% helps to protect the water soluble neutral polysaccharide guar gum from thermal degradation. The greater the amount of sulphite incorporated the more viscous the guar is post-retorting. Starch granules, from a wide range of sources, swell when heated in excess water. The amount of polysaccharide released from the swollen granule after pasting for 60 min at 95°C is increased by the inclusion of low levels (~0.01%) of sulphite. For cassava starch, a pronounced min. in swelling vol. is observed at this sulphite level. This min. has been related to the pro-oxidant activity of the sulphite in contrast to the antioxidant activity shown for the guar. Intrinsic viscosity data indicates that the action of the sulphite is to degrade the polysaccharides within the starch granule and this can be reduced by scavenging oxygen from the system or by the addition of propyl gallate. It therefore appears that low levels of sulphite protect guar gum from degradation but can cause degradation of the starch polysaccharides. AA

29

Adams (JB). **Regeneration and the kinetics of peroxidase inactivation.** *Food Chemistry* 60(2); 1997; 201-206

The objective of this work was to investigate why non-linear first-order kinetics of inactivation are observed when high-purity horseradish peroxidase (HRP) is heated under mildly acidic conditions. On heating HRP at 70°C in acetate, pH 5.6, strong activity regeneration was found after short heating times whilst weak regeneration was observed after more extensive heating. This variation in regeneration is proposed as the major cause of the non-linear inactivation behaviour. Support for this

proposal was the finding that simple first-order kinetics are followed when no regeneration occurred after heating the enzyme under neutral conditions. Using capillary electrophoresis, the major isoenzyme was shown to reform during activity regeneration. Under neutral conditions, new protein sp. were formed as a result of heating but these did not revert to the original isoenzyme on cooling. AA

FOOD MICROBIOLOGY AND HYGIENE

30

Pilkington (PH), Margaritis (A) and Mensour (NA). **Mass transfer characteristics of immobilized cells used in fermentation processes.** *CRC Critical Reviews in Biotechnology* 18(2/3); 1998; 237-255

The fundamental principles of mass transfer (MT) in immobilized cell systems are covered in this review. Importance of immobilized cells in fermented beverage production, relevance of MT to immobilized cell systems (ICS); MT theoretical considerations; external MT in ICS, theoretical models for MT at the liquid-solid interface: film theory, penetration theory, surface renewal theory, MT coefficient, equations for predicting solute mol. diffusivities in the bulk liquid phase: partition coefficient, internal MT in ICS; experimental methods for measuring solute diffusivities in immobilization matrices: concn. gradient methods (CGMs): steady-state diaphragm cell, CGMs: non steady-state, time-lag diaphragm cell, uptake/release from immobilization matrices, concn. profile in a semiinfinite slab: sectioning method are the aspects covered. Many references. SRA

Enzymes

31

Meyer (AS), Pedersen (LH) and Isaksen (A). **The effect of various food parameters on the activity and stability of catalase from *Aspergillus niger* and catalase from bovine liver.** *Food Chemistry* 60(2); 1997; 137-142

The effects of a number of food relevant parameters on catalase activity (CA) and stability were studied. The direct responses of different combinations of the parameters ethanol, pH and ionic strength on bovine liver catalase (BLC) and *Aspergillus niger* CA were

investigated in a full factorial 2^4 statistically designed experiment. Statistically significant effects ($P = 0.001$) on both types of catalases were exerted by ethanol (2% approx. 420 mM), decreased pH (4.5), and high ionic strength ($I = 2$). Further, it was found that *A. niger* catalase was comparatively more robust to low pH than BLC, but that BLC activity was significantly more tolerant to ethanol (2%) than catalase from *A. niger*. The stability of BLC and *A. niger* CA to 32 different combinations of the parameters pH, ethanol, ascorbic acid, enzyme concn., enzyme type, protein concn., storage temp. and atm. in headspace were monitored during 12 days. As expected, the responses to the different treatments varied significantly with time. It was found that ascorbic acid (500 ppm approx. 2.85 mM), low pH (pH 4.5) and increased storage temp. (25°C) each exerted significantly destabilising effects on CA ($P < 0.05$), while addition of ethanol (2%) resulted in a statistically significant stabilising effect ($P = 0.001$) that increased during the test period. During storage, ethanol was also found to exert significantly positive 2 factor interactions with ascorbic acid and temp., resp., signifying that addition of ethanol (2%) protected both types of catalases against inhibition by ascorbic acid (500 ppm) and against destabilisation by increased temp. (25°C) during storage. AA

32

Figueroa-Espinoza (MC) and Rouau (X). **Oxidative cross-linking of pentosans by a fungal laccase and horseradish peroxidase: Mechanism of linkage between feruloylated arabinoxylans.** *Cereal Chemistry* 75(2); 1998; 259-265

The potential of a laccase from the fungus *Pycnoporus cinnabarinus* to cross-link feruloylated soluble wheat arabinoxylans was investigated using capillary viscometry, size-exclusion HPLC, and RP-HPLC of phenolic compounds. The laccase results were compared with those for a H_2O_2 /horseradish peroxidase system. The oxidants provoked an increase in viscosity of a 0.2% (w/v) arabinoxylan solution. A gel was formed after 30 min with laccase. H_2O_2 was consumed rapidly before a gel could be formed. Free ferulic acid, methyl ferulate, and vanillic acid inhibited the gelation, whereas fumaric acid had no effect. This suggests that the aromatic ring, and not the propenoic chain of ferulic acid, was the initiating site for arabinoxylan cross-linking. Ferulic acid and its 8-O-4', 8-5' and 5-5' dehydrodimers were present in nonoxidized arabinoxylans. Upon oxidation, the 8-8' and 8-5'

benzofuran dehydrodimers appeared and the 8-O-4' and 8-5' dimers increased. The production of dimers was proportional to the consumption of ester-bound ferulic acid. In cross-linked arabinoxylans, the major dimers were 8-5' benzofuran, 8-8' and 8-O-4', whereas the 5-5' dehydrodimer remained at the same level as in the nonoxidized solution. AA

Fermented foods

33

Sultana (K) and Su (P). **Ethnic fermented foods and trends in Asia.** *Food Australia* 50(10); 1998; 485-486

Traditional dairy foods, new attitudes and market potential in Asian countries are discussed. SRA

Microorganisms

34

Scheu (PM), Berghof (K) and Stahl (U). **Detection of pathogenic and spoilage microorganisms in food with the polymerase chain reaction.** *Food Microbiology* 15(1); 1998; 13-31

An overview of polymerase chain reaction (PCR)-systems for the detection of bacteria and viruses in food is provided in this paper. Possible reasons for PCR inhibition and ways to differentiate between viable and dead microorganisms are discussed. General aspects of genotypic detection (characteristics of target nucleic acids, detection methods), *in vitro* amplification methods, PCR, limits of PCR are included in the topics. PCR-systems for the detection of bacteria and viruses in food products and raw materials are tabulated. Many references. SRA

35

Peleg (M) and Cole (MB). **Reinterpretation of microbial survival curves.** *CRC Critical Reviews in Food Science and Nutrition* 38(5); 1998; 353-380

The objectives of this work are to reintroduce and discuss the unifying approach in more detail and to explore its potential implications in the safety evaluation of thermal and other processes of food preservation. Aspects covered are, the model (linear vs semilogarithmic coordinates, mixed populations, effect of the medium), analysis of published survival curves (expressing the effects of external conditions

in terms of shifts in the resistance distributions), implications in food preservation (over- and underprocessing, establishing equivalent preservation regimes and mechanistic aspects). Many references. SRA

36

Turker (N) and Hamamci (H). **Storage behaviour of immobilized dried microorganisms.** *Food Microbiology* 15(1); 1998; 3-11

In 2 sets of experiments the immobilized cells of the wine yeast *Saccharomyces cerevisiae* and the mixed culture of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* were dried and tested for storage ability at 4°C. Both K-carrageenan and alginate were used as entrapment matrices. The beads with the cells were either dried right after immobilization or activated prior drying. For *S. cerevisiae* the best results were attained with the primarily activated (PA) alginate entrapped cells (69.5% activity retention). For the lactic acid bacteria mixed culture, no activity was detected for the directly dried beads. For the PA cells, it was observed that upon drying the activities of K-carrageenan and alginate entrapped cells decreased to about 77 and 73%, resp., after 36 days of storage. For both matrices PA beads required longer period of drying over directly dried ones. SRA

Bacteria

37

Berry (ED) and Siragusa (GR). **Hydroxyapatite adherence as a means to concentrate bacteria.** *Applied and Environmental Microbiology* 63(10); 1997; 4069-4074

Adherence to hydroxyapatite (HA) was examined as a method to conc. bacteria from foods. Using HA at a level of 10% and suspensions of an *Escherichia coli* strain containing 10^9 , 10^6 and 10^3 cells per ml, kinetic studies revealed that max. adherence was attained within 5 min for all cell concn. and that comparable log reductions (1.0 to 1.5) of cells in suspension were seen regardless of initial cell concn. Eleven sp. of spoilage and pathogenic bacteria were found to adhere to HA, with seven sp. adhering at proportions of > 95%. Fluorescent viability staining revealed that cells bound to HA remained viable. There was > 92% adherence of indigenous bacteria to HA from three of five 1:10 dilutions of ground beef, indicating promise for the

use of HA for concentrating bacteria from meat and other food samples. AA

Bacillus sporothermodurans

38

Herman (LMF), Vaerewijck (MJM), Moermans (RJB) and Waes (GMAVJ). **Identification and detection of *Bacillus sporothermodurans* spores in 1, 10 and 100 millilitres of raw milk by PCR.** *Applied and Environmental Microbiology* 63(8); 1997; 3139-3143

A PCR method was developed to detect spores of *Bacillus sporothermodurans* in 1, 10 and 100 ml of raw milk. Two primers were derived from a unique sequence after subtractive hybridization of *B. sporothermodurans* DNA with DNA of MB 397, a not yet identified spore-forming bacterium isolated from raw milk, closely related to *B. sporothermodurans*. Specific identification was proven on a large collection of *Bacillus* strains and on strains from relevant taxa. The detection of *B. sporothermodurans* in raw milk is based on activation, germination and outgrowth of the spores, followed by PCR identification. Spores from 10 and 100 ml were conc. by centrifugation after chemical extraction of the milk components. The total test takes 28 h. The detection limits are 9, 0.4 and 0.22 CFU/ml for 1, 10 and 100 ml, resp. AA

Bacillus subtilis

39

Nagai (T) and Itoh (Y). **Characterization of a generalized transducing phage of poly- γ -glutamic acid-producing *Bacillus subtilis* and its application for analysis of Tn917-LTV1 insertional mutants defective in poly- γ -glutamic acid production.** *Applied and Environmental Microbiology* 63(10); 1997; 4087-4089

A generalized transducing phage, ϕ BN100, was isolated from a *Bacillus subtilis* (natto) strain producing poly- γ -glutamic acid (γ PGA). Transduction frequencies for a given marker ranged from 3.8×10^{-8} to 1.6×10^{-6} per phage particle. The genome size of the phage was approx. 42 kb. ϕ 100 was used successfully to identify bonafide Tn917-LTV1 transpositional mutants defective in γ PGA production. AA

Campylobacter jejuni

40

Mihowich (MF), Brooks (BW), Sushama Joshi and Yamazaki (H). **A liquid medium for growth of the thermophilic *Campylobacters* in a carbon dioxide air mixture as studied by polymyxin-cloth enzyme immunoassay.** *Food Microbiology* 15(1); 1998; 119-125

A new liquid medium containing casein hydrolysate, beef extract, yeast extract, biocarbonate and an erythrocyte digest was developed for growth of *Campylobacter jejuni* and other thermophilic *Campylobacter* spp. 26 strains, consisting of 6 Penner serotypes and the 20 most common Lio serogroups, were evaluated and all grew well in this medium at 40°C in an atm. of 5% CO₂ moist air. Furthermore, this medium allowed growth of these bacteria without exogenous CO₂ at 40°C. After incubation for 28 h in 5% CO₂ or 36 h without exogenous CO₂, cultures inoculated with approx. 10² cfu/ml reached cell densities of 10⁶ to 10⁹ (mean 10⁸) cfu/ml and produced positive signals in the polymyxin-cloth enzyme immunoassay. This medium therefore has the potential to provide rapid and affordable isolation of these pathogens for a Hazard Analysis Critical Control Point program. AA

Clostridium perfringens

41

Schalch (B), Bjorkroth (J), Eisgruber (H), Korkeala (H) and Stolle (A). **Ribotyping for strain characterization of *Clostridium perfringens* isolates from food poisoning cases and outbreaks.** *Applied and Environmental Microbiology* 63(10); 1997; 3992-3994

Ribotyping was used to characterize 34 *Clostridium perfringens* strains isolated from 10 food poisoning cases and outbreaks over a 7-yr. period. Twelve different ribopatterns were generated by *EcoRI* digestion. In eight food poisoning cases and outbreaks, all of the ribotypes of each food and stool isolate were found to be identical. Two *C. perfringens* isolates showed unique patterns. Ribotyping was found to be a useful tool for determining the genetic relationship of *C. perfringens* isolates in the context of foodborne poisoning cases. AA

Escherichia coli

42

Venkateswaran (K), Kamijoh (Y), Ohashi (E) and Nakanishi (H). **A simple filtration technique to detect enterohemorrhagic *Escherichia coli* 0157:H7 and its toxins in beef by multiplex PCR.** *Applied and Environmental Microbiology* 63(10); 1997; 4127-4131

Lactococcus lactis

43

Riepe (HR), Pillidge (CJ), Gopal (PK) and McKay (LL). **Characterization of the highly autolytic *Lactococcus lactis* subsp. *cremoris* strains CO and 2250.** *Applied and Environmental Microbiology* 63(10); 1997; 3757-3763

Two highly autolytic *Lactococcus lactis* subsp. *cremoris* strains (CO and 2250) were selected and analyzed for their autolytic properties. Both strains showed max. lysis when grown in M17 broth containing a limiting concn. of glucose (0.4 to 0.5%) as the carbohydrate source. Lysis did not vary greatly with pH or temp., but was reduced when strains were grown on lactose or galactose. Growth in M17 containing excess glucose (1%) prevented autolysis, although rapid lysis of *L. lactis* subsp. *cremoris* CO did occur in the presence of 1% glucose if Na fluoride (an inhibitor of glycolysis) was added to the medium. Max. cell lysis in a buffer system was observed early in the stationary phase, and for CO, 2 pH optima were observed for log-phase and stationary-phase cells (6.5 and 8.5, resp.). Autolysins were extracted from the cell wall fraction of each strain by using either 4% Na dodecyl sulphate (SDS), 6 M guanidine hydrochloride, or 4 M lithium chloride, and their activities were analyzed by renaturing SDS-PAGE on gels containing *Micrococcus luteus* or *L. lactis* subsp. *cremoris* CO cells as the substrate. More than one lytic band was observed on each substrate, with the major band having an apparent mol. mass of 48 kDa for CO. Each lytic band was present throughout growth and lysis. These results suggest that at least 2 different autolytic enzymes are present in the autolytic *L. lactis* subsp. *cremoris* strains. The presence of the lactococcal cell wall hydrolase gene, *acmA*, in strains 2250 and CO was confirmed by Southern hybridization. Analysis of an *acmA* deletion mutant of 2250 confirmed that the gene was involved in cell separation and had a role in cell lysis. AA

Listeria

44

Loncarevic (S), Danielsson-Tham (M-L), Gerner-Smidt (P), Sahlstrom (L) and Tham (W). **Potential sources of human listeriosis in Sweden.** *Food Microbiology* 15(1); 1998; 65-69

Listeria monocytogenes

45

Datta (AR) and Benjamin (MM). **Factors controlling acid tolerance of *Listeria monocytogenes*: Effects of nisin and other ionophores.** *Applied and Environmental Microbiology* 63(10); 1997; 4123-4126

The acid tolerance of a *Listeria monocytogenes* serotype 4b strain was studied by measuring its ability to survive at an acidic pH at 37°C. The acid tolerance of *L. monocytogenes* was much lower than those of *Escherichia coli* 0157:H7 and *Shigella flexneri* strains. This observation suggested a higher infective dose for *L. monocytogenes* than *E. coli* 0157:H7 and *Shigella*. The susceptibility of *L. monocytogenes* to acidic pH was dependent upon growth medium pH and growth phase of the culture. Nisin and some other ionophores reduced the acid tolerance of both stationary-phase and log-phase cultures of *L. monocytogenes*. These studies indicated that nisin might be a useful candidate for controlling acid tolerance of *L. monocytogenes*. AA

46

Annous (BA), Becker (LA), Bayles (DO), Labeda (DP) and Wilkinson (BJ). **Critical role of anteiso-C_{15:0} fatty acid in the growth of *Listeria monocytogenes* at low temperatures.** *Applied and Environmental Microbiology* 63(10); 1997; 3887-3894

47

Pagan (R), Condon (S) and Sala (FJ). **Effects of several factors on the heat-shock-induced thermotolerance of *Listeria monocytogenes*.** *Applied and Environmental Microbiology* 63(8); 1998; 3225-3232

The influence of the temp. at which *Listeria monocytogenes* had been grown (4 or 37°C) on the response to heat shocks of different durations at different temp. was investigated. For cells grown at

4°C, the effect of storage, prior to and after heat shock, on the induced thermotolerance was also studied. Death kinetics of heat-shocked cells is also discussed. For *L. monocytogenes* grown at 37°C, the greatest response to heat shock was a fourfold increase in thermotolerance. For *L. monocytogenes* grown at 4°C, the greatest response to heat shock was a sevenfold increase in thermotolerance. The only survival curves of cells to have shoulders were those for cells that had been heat shocked. A 3% concn. of NaCl added to the recovery medium made these shoulders disappear and decreased decimal reduction times. The percentage of cells for which thermotolerance increased after a heat shock was smaller the milder the heat shock and the longer the prior storage. AA

48

Zheng (W) and Kathariou (S). **Host-mediated modification of *Sau3AI* restriction in *Listeria monocytogenes*: Prevalence in epidemic-associated strains.** *Applied and Environmental Microbiology* 63(8); 1997; 3085-3089

Most major food-related outbreaks of listeriosis have been traced to a cluster of genetically related strains of serovar 4b (epidemic clone). In spite of numerous searches, distinct bacteriologic or virulence-related features unique to these strains have eluded identification, although a restriction fragment length polymorphism (RFLP) characteristic of the epidemic clone has previously been described. It was found that DNAs from 75 strains which were derived from three separate outbreaks and which had the epidemic clone-specific RFLP were also invariably resistant to digestion by *Sau3AI* and other restriction endonucleases sensitive to cytosine methylation at 5' GATC 3' sites. This modification of *Sau3AI* restriction was host mediated, as it did not persist when DNA was cloned and propagated in *Escherichia coli*, and was uncommon among other *Listeria* strains. Epidemic-associated strains with this modification were resistant to infection by phage propagated in a serotype 4b strain which was not known to be involved in an epidemic and which lacked the epidemic clone-specific RFLP. Screening for susceptibility to *MboI* digestion revealed that these epidemic strains lacked methylation of adenines at GATC sites. This type of modification was rare among *Listeria* strains and was found in only three (of eight screened) strains of serovar 1/2b, possibly representing one clonal lineage. AA

49

Loessner (MJ), Rudolf (M) and Scherer (S). **Evaluation of luciferase reporter bacteriophage A511::luxAB for detection of *Listeria monocytogenes* in contaminated foods.** *Applied and Environmental Microbiology* 63(8); 1997; 2961-2965

A511::luxAB is a recombinant derivative of a broad-host-range bacteriophage specific for the genus *Listeria*, transducing bacterial bioluminescence into infected cells. In this study, its use for rapid and easy testing of contaminated foods and environmental samples for the presence of viable *Listeria* cells was evaluated, in comparison to the standard plating procedure. With a short preenrichment step of 20 h, the system was capable of detecting very low initial contamination rates in several foods artificially contaminated with *Listeria monocytogenes* Scott A cells. In ricotta cheese, chocolate pudding, and cabbage, < one cell/g of food could be clearly identified by comparing the light emission of phage-infected samples to that of controls without lux phage. In foods having a large and complex microbial background flora, such as minced meat and soft cheese, at least 10 cells/g were necessary to produce a positive bioluminescence signal. Of 348 potentially contaminated natural food and environmental samples, 55 were found to be *Listeria* positive by the lux phage method. The standard plating procedure detected 57 positive samples. Some differences were observed with respect to the individual samples, i.e., the lux phage procedure detected more positive samples among the dairy products and environmental samples, whereas the plating procedure revealed more contaminated meat and poultry samples. Overall, both methods performed similarly, i.e., were equally sensitive. However, the min. time required for detection of *Listeria* with the luciferase phage assay was 24 h, which is much shorter than the 4 days needed by the standard plating method. Furthermore, a most probable number technique with three parallels, based on the use of A511-luxAB for differentiation of positive and negative tubes, is described. The method enables rapid enumeration of low levels of *Listeria* cells in several foods tested, against the background of a competing microflora. AA

Staphylococcus aureus

50

Tsen (HY), Yu (GK), Wang (KC), Wang (SJ), Chang (MY), Lin (LY). **Comparison of the enterotoxigenic types, toxic shock syndrome toxin 1 (TSST-1) strains and antibiotic susceptibilities for enterotoxigenic *Staphylococcus aureus* strains isolated from food and clinical samples.** *Food Microbiology* 15(1); 1998; 33-41

Streptococcus thermophilus

51

Brutin (A), Desiere (F), d'Amico (N), Guerin (J-P), Sidoti (J), Huni (B), Lucchini (S), Brussow (H). **Molecular ecology of *Streptococcus thermophilus* bacteriophage infections in a cheese factory.** *Applied and Environmental Microbiology* 63(8); 1997; 3144-3150

A Mozzarella cheese factory using an undefined, milk-derived *Streptococcus thermophilus* starter system was monitored longitudinally for 2 yrs. to determine whether the diversity of the resident bacteriophage population arose from environmental sources or from genetic changes in the resident phage in the factory. The two hypotheses led to different predictions about the genetic diversity of the phages. With respect to host range, 12 distinct phage types were observed. With two exceptions, phages belonging to different lytic groups showed clearly distinct restriction patterns and multiple isolates of phages showing the same host range exhibited identical or highly related restriction patterns. Sequencing studies in a conserved region of the phage genome revealed no point mutations in multiple isolates of the same phage type, while up to 12% nucleotide sequence diversity was observed between the different phage types. The diversity is as large as that between the most different sequences from phages in collection. These observations make unlikely a model that postulates a single phage invasion event and diversification of the phage during its residence in the factory. In the second stage of our factory study, a defined starter system was introduced that could not propagate the resident factory phage population. Within a wk., three new phage types were observed in the factory while the resident phage population was decreased but not eliminated. Raw milk was the most likely source of these new phages, as phages with identical host ranges and restriction patterns were

isolated from raw milk delivered to the factory during the intervention trial. Apparently, all of the genetic diversity observed in the *S. thermophilus* phages isolated during the survey was already created in their natural environment. A better understanding of the raw-milk ecology of *S. thermophilus* phages is thus essential for successful practical phage control. AA

Vibrio vulnificus

52

Kim (CM), Jeong (KC), Rhee (JH) and Choi (SH). **Thermal-death times of opaque and translucent morphotypes of *Vibrio vulnificus*.** *Applied and Environmental Microbiology* 63(8); 1997; 3308-3310

Thermal-death times were determined for *Vibrio vulnificus* strains with different morphotypes. Opaque strains showed higher D values (times required to reduce the viable population of a given strain by 90%) than translucent strains. Z values (absolute values of the temp. required to reduce 1 log scale of D values) were also significantly higher in opaque morphotypes (2.4 to 2.5°C) than in translucent ones (1.7 to 2.1°C). These results indicate that the morphotype is related to the organism's susceptibility to heat. AA

Fungi

53

Cuppers (HGAM), Oomes (S) and Brul (S). **A model for the combined effects of temperature and salt concentration on growth rate of food spoilage molds.** *Applied and Environmental Microbiology* 63(10); 1997; 3764-3769

Mold growth on a solid culture medium at various temp. and NaCl concn. modeled by using 5 common food spoilage molds (*Penicillium roqueforti*, *Trichoderma harzianum*, *Paecilomyces variotii*, *Aspergillus niger* and *Emmericella nidulans*). For the description of the growth rate (expressed as the increase in colony diam. per unit of time) as a function of temp. and NaCl concn., a six-parameter model has been developed. The model combines either the Rosso-type or the Ratkowsky-type temp. dependence with the NaCl concn. dependence derived from the relationship between the growth rate and square root of (1-aw), as proposed by Gibson and coworkers. The model will be of use to

food microbiologists whose aim is to predict the likelihood of fungal spoilage. AA

Algae

54

Medina (AR), Grima (EM), Gimenez (AG) and Gonzalez (MJI). **Downstream processing of algal polyunsaturated fatty acids.** *Biotechnology Advances* 16(3); 1998; 517-580

Reviews recovery and purification of microalgae derived polyunsaturated fatty acids and techniques developed for use with fish oil. The two main techniques for concentrating and purifying-urea fractionation and HPLC are also discussed. Other potentially useful techniques, such as supercritical fluid extraction and lipase-catalysed processing are detailed. 119 references. GS

55

Becker (CC) and Kyle (DJ). **Developing functional foods containing algal docosahexaenoic acid.** *Food Technology* 52(7); 1998; 68-71

Discusses that docosahexaenoic acid (DHA), an essential long-chain fatty acid of the ω -3 family is now being produced in commercial quantities from cultured algae for use in products ranging from infant formula to nutritional bars. CSA

Mushrooms

56

Rajaratnam (S), Shashirekha (MN) and Zakia Bano. **Biodegradative and biosynthetic capacities of mushrooms: Present and future strategies.** *CRC Critical Reviews in Biotechnology* 18(2/3); 1998; 91-236

This review covers, morphology and life cycle of mushrooms, chemistry and nutritional evaluation, biodegradative capacities (degradation of cellulose, hemicellulose and lignin, mechanism of lignin degradation, degradatory enzymes; ligninolytic enzymes, lignin peroxidases; Mn peroxidases, laccases, aryl-alcohol oxidases; biological pulping, kraft pulp discoloration, decolourization of waste waters, coal solubilization; degradation of polystyrenes; bioremediation of toxic environmental pollutants: chlorinated organic compounds, polycyclic aromatic hydrocarbons, nitro-substituted

compounds, dyes, other toxic compounds); biosynthetic capacities (biomass, carbohydrates, amino acids, peptides and proteins, lipids, vitamins, flavour compounds, nucleic acids, minerals, pigments, chitin, polysaccharides, other biological useful constituents, toxic substances, enzymes and coenzymes: carbohydrates, proteinases, lignin-peroxidases and Mn-peroxidases, phenol-oxidase, other enzymes, various other compounds). Many references. SRA

Hygiene

57

Dhanakumar (VG). **HACCP: For plantation production, quality and safety to delight the customers.** *Indian Coffee* 62(8); 1998; 24-25, 27

The role of enforcement authorities, international standardisation, prioritization, additional objectives, preparing plantation for HACCP (quality assurance/technical, operations or production, engineering and additional expertise) are reviewed. SRA

58

Dhanakumar (VG). **HACCP: For plantation production, quality and safety to delight the customers.** *Indian Coffee* 62(7); 1998; 23, 25, 27, 28

Outlines the necessity of hazards analysis critical control points (HACCP) for plantation industry with appropriate model to prevent contamination of product at different stage of processing (from raw materials to end product). The quality management for product safety, identification of critical control points in plantation, and principles of HACCP for quality management are further reviewed. SRA

BIOTECHNOLOGY

59

Hashimoto (W), Inoso (T), Masuda (K) and Murata (K). **Safety assessment of genetically engineered yeast: Elimination of mutagenicity of the yeast *Saccharomyces cerevisiae* by decreasing the activity of methylglyoxal synthase.** *International Journal of Food Science and Technology* 32(6); 1997; 521-526

Methylglyoxal synthase catalyses the transformation of dihydroxyacetonephosphate to methylglyoxal, a toxic 2-oxoaldehyde which is found to be present in the yeast *Saccharomyces cerevisiae* DKD-5D-H. Yeast cells in which genes for phosphoglucose isomerase, phosphofructokinase and triosephosphate isomerase had been extrachromosomally amplified by using a multi-copy plasmid showed an increased ability to induce mutagenesis in standard tests when compared to wild type yeast. This response is mainly due to the increased amount of methylglyoxal in the engineered cells. To decrease the mutagenic activity and make it possible to use genetically engineered yeasts for practical fermentation processes, a mutant having a decreased level of methylglyoxal synthase activity was isolated. When transformed with genes for the glycolytic enzymes, the mutant cells showed extremely low levels of methylglyoxal content and mutagenic activity, both levels being comparable with those of non-transformed DKD-5D-H cells. AA

TISSUE CULTURE

Nil

FOOD ADDITIVES

60

Plumb (GW), Chambers (SJ), Lambert (N), Wanigatunga (S) and Williamson (G). **Influence of fruit and vegetable extracts on lipid peroxidation in microsomes containing specific cytochrome P450s.** *Food Chemistry* 60(2); 1997; 161-164

The effect of 12 food extracts on Fe/ascorbate-induced lipid peroxidation using microsomes enriched with specific cytochrome P450 isoenzymes, namely 1A1 and 3A4, prepared from human lymphoblastic cells was examined. As a comparison, control microsomes were also studied, which contained negligible amounts of cytochrome P450. Antioxidant effects with both control and P450-containing microsomes in the case of grapefruit, green tea, coffee, tarragon and rosemary extracts was observed. Pro-oxidant effects were observed for the brassica extracts (cabbage, cauliflower and Brussels sprouts) for all three microsome groups. Differences in the degree of lipid peroxidation between microsomes containing

P450s 1A1/3A4 and control microsomes were seen for apple, tomato and parsnip peel extracts. The antioxidant properties of some of the food extracts were therefore modified by the presence of specific P450s. The results demonstrate the potential of P450-enriched microsomes in determining the antioxidant properties of food extracts and components. AA

61

Massey (RC). **Estimation of daily intake of food preservatives.** *Food Chemistry* 60(2); 1997; 177-185

The various methods employed to determine intake levels for food preservatives are discussed and their respective merits reviewed. Aspects covered are: intake measurement method (per capita method, food diary records, dietary recall and food frequency, total diet study, targeted surveys, duplicate diet studies, biomarker-based methods), method selection, estimation of intake of nitrite and nitrate (toxicological properties of nitrite and nitrate; dietary intake of nitrite/nitrate (per capita, total diet study, duplicate diet study, food frequency investigation, comparison of dietary intake of nitrite from different methods), analytical methodology for nitrite and nitrate (analytical measurement)). 25 references. BV

62

Kansci (G), Genot (C), Meynier (A) and Gandemer (G). **The antioxidant activity of carnosine and its consequences on the volatile profiles of liposomes during iron/ascorbate induced phospholipid oxidation.** *Food Chemistry* 60(2); 1997; 165-175

The natural dipeptide L-carnosine (β -Ala-His) exhibits antioxidative properties and can be used as an antioxidant in food products. Its antioxidant activity and its effect on the volatile compounds produced during lipid oxidation was studied in a meat-related model system (liposomes of muscle phospholipids). Oxygen uptake, conjugated dienes, trienes and ketodienes, thiobarbituric acid reactive substances (TBARS) and volatile compounds were measured after induction of oxidation by equimolar Fe(III)/ascorbate (45 μ M). Inclusion of carnosine (2-10 mM) lead to a decrease in all indices of lipid oxidation, except for the initial rate of oxygen uptake, which increased, and the rates of oxygen uptake 5 or more min after catalyst injection, which remained

constant. The decrease varied as a function of carnosine concn., method of measurement and incubation time. When carnosine was added to previously oxidised liposomes, TBARS, t-2-undecenal, total 2-alkenals and hexanol amounts decreased significantly. Carnosine antioxidant activity is multifunctional: it has a buffering effect; it interferes in the initiation step of oxidation; it decreases the amount of preformed peroxides; it reacts with some secondary products. AA

Colourants

63

Rich (DC). **Artificial intelligence in today's colorant management systems.** *Cereal Foods World* 43(6); 1998; 415-417

Artificial intelligence software can offer a greater level of colour control than ever before. This level of control encompasses everything from correcting colour formulas with a master shader's efficiency to defining colour tolerances is the aspect discussed in this article. CSA

Emulsifiers

64

Rao (HGR) and Kumar (HRH). **Emulsion stability in food products.** *Indian Food Industry* 17(2); 1998; 77-78

Definition of emulsion, classification of food emulsions into oil-in-water emulsion and water-in-oil emulsion, classification based on the size of the dispersed phase globules, emulsion stability (ES), factors affecting ES (droplet size, temp., viscosity, pH, the nature of the interfacial film, solubility), methods for determination of ES (gravimetric methods, optical methods/turbidometry, measurement of the dielectric constant, pulsed NMR measurement, radiation method), processes that cause emulsion instability (creaming, flocculation, coalescence, Ostwald ripening), ES of proteins, emulsifiers, desirable characteristics of emulsifiers, calculation of HLB value of an emulsifier and application of emulsifiers are the various aspects described in this article. CSA

Flavourings

65

Kumar (CG), Sharma (A) and Kanawjia (SK). **Prospects for bioproduction of food flavours.** *Indian Food Industry* 17(2); 1998; 98-111

The article delineates the various biotechnological processes involving microorganisms, their enzymes and their bioconversion pathways for the production of food flavours. The plant cell tissue culture techniques, which are catching up importance for flavour production are also described. CSA

Sweeteners

66

Dias (FF) and Mehta (D). **Nutritive sweeteners from starch.** *Indian Food Industry* 17(2); 1998; 112-120

Discusses the different types of sweeteners produced from starch such as glucose syrups, acid-enzyme syrups, enzyme-enzyme syrups, dextrose, high fructose syrup, sorbitol, maltitol and hydrogenated glucose syrup and their preparation, production and application in foods. CSA

CEREALS

67

Matser (AM) and Steeneken (PAM). **Filtration characteristics of maize and wheat starch hydrolysates.** *Cereal Chemistry* 75(2); 1998; 241-246

Starch hydrolysates were prepared by one-or two-stage hydrolysis with α -amylase. The filtration rate of wheat starch hydrolysates was considerably lower than that of maize starch hydrolysates. Omitting the second conversion step lowered the filtration rates of wheat and maize starch hydrolysates. Increasing the incubation time or the enzyme dosage resulted in an increase of the filtration rate of maize starch hydrolysates due to the increase in the dextrose equivalent. These process variables did not influence the filtration rate of wheat starch hydrolysates. Wheat starch hydrolysates had very poor filtration characteristics: low filtration rates, almost no removal of undesired components, and obstruction of the filter cake. On the contrary, maize

starch hydrolysates showed good filtration characteristics: a high filtration rate and removal of the largest part of the undesired components. On storage, wheat starch hydrolysates separated into three layers. The intermediate fraction had a higher filtration rate than the total hydrolysate. Adding small amounts of the upper or lower layers to dextrose solutions decreased the filtration rate to that of a wheat starch hydrolysate. This was due to an increase of the protein and lipid concn. AA

Barleys

68

Kim (Y), Lee (YC) and Kim (KO). **Optimum roasting and extraction conditions and flavour characteristics of roasted malt extract.** *Cereal Chemistry* 75(3); 1998; 282-288

Malt was roasted at 235, 245, or 255°C and extracted at 75, 85, or 95°C in hot water for 10, 20 or 30 min. Optimum roasting and extraction conditions were chosen using response surface methodology based on sensory and physicochemical properties. Sensory properties of roasted malt extract produced at optimum conditions were compared with those of roasted barley extract and of commercial barley tea using quantitative descriptive analysis. Flavour compounds in roasted malt extract were identified by GC and MS. Correlation between sensory and GC-MS data were calculated. Roasting malt at 240°C and extracting at 75°C for 28 min were found to be optimum conditions for roasted malt extract. The results of sensory and GC-MS data indicated that the most dominant flavour compounds in roasted barley and malt were aldehydes and pyrazines. AA

69

Kanauchi (O), Agata (K) and Fushiki (T). **Mechanism for the increased defecation and jejunum mucosal protein content in rats by feeding germinated barley foodstuff.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 443-448

70

Zheng (G-H) and Bhatti (RS). **Enzyme-assisted wet separation of starch from other seed components of hull-less barley.** *Cereal Chemistry* 75(2); 1998; 247-250

A multiple enzyme cocktail containing cellulase, *endo*-(1-3),(1-4)- β -D-glucanase and xylanase was used in wet separation of starch, protein, β -glucan, bran, and tailings from four hull-less barleys (HB): SB94794 (0% amylose), CDC Candle (5% amylose), CDC Dawn (24% amylose), and SB550831 (40% amylose). Compared to a conventional procedure, the enzyme-assisted wet extraction reduced slurry viscosity by 50-99%, the amount of water and ethanol used in screening and β -glucan precipitation by 30-60%, and screening time by 20-80%. The enzyme-assisted extraction reduced starch contents and yields of tailings and bran fractions, resulting in a 10% increase in av. starch extraction efficiency. However, β -glucan yield was reduced in the enzyme-assisted extraction, particularly in high-viscosity HB. The physicochemical properties of isolated starches were not affected by the enzyme-assisted extraction. AA

Buckwheat

71

Rayas-Duarte (P), Majewska (K) and Doetkott (C). **Effect of extrusion process parameters on the quality of buckwheat flour mixes.** *Cereal Chemistry* 75(3); 1998; 338-345

A response surface analysis using a second-order central composite design was used to study the effect of extrusion process parameters on the extrudate quality of 3 blends containing buckwheat flour. The extrudates were prepared as 3 blends. Blend 1 was a 55:40:5 (w/w) mix of light buckwheat flour, wheat flour, and nonfat dry milk (NFDM). Blend 2 was a 40:55:5 mix of light buckwheat, flour, corn meal and NFDM. Blend 3 was a 30:60:10 mix of light buckwheat flour, corn meal, and NFDM. The blends were processed in a twin-screw extruder with factorial combinations of the parameters including: process temp. of 95-150°C, dough moisture of 15-22%, and screw speeds of 260-390 rpm. The linear components alone significantly explained most of the variation of expansion index, bulk density, water absorption, and breaking strength. The greatest amount of variability was explained by process temp. for blend 1. Dough moisture accounted for the greatest amount of variation for blends 2 and 3. Max. predicted expansion index values and high water absorption percentages were obtained at low dough moisture levels. Dough moisture and process temp. were the most important factors predicting bulk density. Sensory evaluation

of texture, colour, flavour and general acceptability scores of selected samples ranked blend 3 > blend 2 > blend 1. The *in vitro* protein digestibility values ranked blend 1 > blend 2 > blend 3. An increase of up to 9.5% units in the protein digestibility values was observed when compared to the nonextruded raw blends. AA

72

Qian (J), Rayas-Duarte (P) and Grant (L). **Partial characterization of buckwheat (*Fagopyrum esculentum*) starch.** *Cereal Chemistry* 75(3); 1998; 365-373

Laboratory-isolated buckwheat (*Fagopyrum esculentum*) starch was compared to commercial corn and wheat starches. Buckwheat starch granules (2.9-9.3 μ m) were round and polygonal with some holes and pits on the surface. Buckwheat starch had higher amylose content, water-binding capacity, and peak viscosity, and it had lower intrinsic viscosity when compared with corn and wheat starches. Buckwheat starch also showed restricted swelling power at 85-95°C and lower solubility in water at 55-95°C and was more susceptible to acid and enzymatic attack. Gelatinization temp., determined by differential scanning calorimetry, were 61.1-80.1°C for buckwheat starch compared to 64.7-79.2°C and 57.1-73.5°C for corn and wheat starches, respectively. A second endotherm observed at 84.5°C was an amylose-lipid complex attributed to the internal lipids in buckwheat starch, as evidenced by selective extraction. The retrogradation of buckwheat, corn, and wheat starch gels was examined after storage at 25, 4 and -12°C for 1-15 days. In general, buckwheat starch retrogradation was slower than that of corn and wheat starch, but it increased as storage time increased, as did that of the other starch pastes. When the values of the three storage temp. were averaged for each storage period analyzed, buckwheat starch gels showed a lower percentage of retrogradation than did corn and wheat starch gels. Buckwheat starch also had a lower percentage of water syneresis when stored at 4°C for 3-10 days and had better stability to syneresis after three freeze-thaw cycles at -12 and 25°C. AA

Oats

73

Peterson (DM). **Malting oats: Effects on chemical composition of hull-less and hulled genotypes.** *Cereal Chemistry* 75(2); 1998; 230-234

Samples of hull-less oat genotypes from the Cooperative Naked Oat Test grown in Ottawa, ON, and Aberdeen, ID, were analyzed for their potential as a food malt. Malted oats had a lower concn. of petroleum ether-extractable lipid, but a much higher percentage of the lipid was in the form of free fatty acids. About 5% less starch and slightly more N was found in malted oats than in unmalted. Malted oats contained approx. 8% soluble carbohydrate. During the germination phase of malting, nearly all the β -glucan was degraded. α -Amylase activity of malted oats approached that of malting barleys, but diastatic power was much lower. Groats of hulled cvs. grown at Madison, WI, were malted and analyzed with similar results. Because the increased levels of free fatty acids in the malted grains may lead to the development of rancid flavours, a method to curtail their increase or selections of genotypes with a min. increase during malting may be necessary to produce a useful malted food product. AA

74

Carriere (CJ) and Inglett (GE). **Solution viscoelastic properties of OATRIM-10 and cooked oat bran.** *Cereal Chemistry* 75(3); 1998; 354-359

The solution rheological behaviours of OATRIM-10 and cooked oat bran were investigated. The rheological properties of the materials were investigated using both thixotropic loop and small-amplitude oscillatory shear experiments. The cooked oat bran exhibited shear-thinning behaviour during a thixotropic loop experiment over a shear rate range of 0-250/sec. The shear-thinning behaviour was reproduced during the measurement of a second thixotropic loop. In contrast, OATRIM-10 exhibited an unexpected region of shear-thickening behaviour at 20-80/sec. The shear-thickening and subsequent shear-thinning regions for OATRIM-10 could be described by a transient network model indicating that the shear-thickening behaviour is caused by a shear-induced entangled network that is partially disentangled at higher shear rates. Subsequent thixotropic loop experiments displayed the shear-thickening region for OATRIM-10, indicating that the network structure can be reformed during the imposition of a shear field. Small-amplitude oscillatory shear data for cooked

oat bran can be described reasonably well using a generalized linear viscoelastic (GLV) model. The oscillatory shear data obtained for OATRIM-10 could not be described by the GLV model. OATRIM-10 exhibited a distinctive plateau centered at 10/sec, and the low frequency response of storage modulus G' decreased with a much larger slope in frequency than was predicted by the GLV model. AA

75

Zhou (M), Robards (K), Glennie-Holmes (M) and Helliwell (S). **Structure and pasting properties of oat starch.** *Cereal Chemistry* 75(3); 1998; 273-281

The structure, composition, and pasting properties of oat starch are reviewed, with particular emphasis on methods of measurement. Future directions of research in this area are suggested. 89 references. BV

Rice

76

Liu (W), Tao (Y), Siebenmorgen (TJ) and Chen (H). **Digital image analysis method for rapid measurement of rice degree of milling.** *Cereal Chemistry* 75(3); 1998; 380-385

A digital image analysis (DIA) method was developed to quickly and accurately measure the degree of milling (DOM) of rice. The DIA method was statistically compared to a chemical analysis method for evaluating DOM, which consisted of measuring the surface lipids concn. (SLC) of milled rice. The surface lipid area percentage (SLAP) obtained by the image analysis method and the SLC obtained by chemical analysis had a high coeff. of detn. using a quadratic model ($R^2 = 0.9819$) and using a logarithmic model ($R^2 = 0.9703$). The quadratic model and the logarithmic model were validated using the test data set and it received high coeff. of detn. ($R^2 = 0.9502$ and $R^2 = 0.9459$, resp). AA

77

Fan (J), Siebenmorgen (TJ), Gartman (TR) and Gardisser (DR). **Bulk density of long- and medium-grain rice varieties as affected by harvest and conditioned moisture contents.** *Cereal Chemistry* 75(2); 1998; 254-258

The effect of harvest and conditioned moisture contents (MC) on bulk density (BD) of rough, brown,

and white rice was determined for several long- and medium-grain rice var. harvested from different Arkansas locations. The results indicated that harvest MC (HMC) significantly affected the BD of freshly harvested and conditioned rough rice. Higher HMC levels resulted in lower BD levels for rough rice over the conditioned MC range from 11 to 29% (wb). There was a strong linear relationship between rough rice BD and conditioned MC for a given HMC. The harvest location had a more pronounced effect on rough rice BD of long-grain var. than of medium-grain var. The BD of brown and white rice was less dependent on harvest location and conditioned MC than the BD of rough rice. Rice harvested at low MC level (approx. 13%) gave a higher BD for both brown and white rice than that harvested at higher MC levels. Medium-grain var. showed a higher BD for brown and white rice than did long-grain var. AA

78

Champagne (ET), Lyon (BG), Min (BK), Vinyard (BT), Bett (KL), Barton (FE), Webb (BD), McClung (AM), Moldenhauer (KA), Linscombe (S), McKenzie (KS), Kohlwey (DE). **Effects of postharvest processing on texture profile analysis of cooked rice.** *Cereal Chemistry* 75(2); 1998; 181-186

The effects of drying conditions, final moisture content, and degree of milling on the texture of cooked rice var., as measured by texture profile analysis, were investigated. Instrumentally measured textural properties were not significantly ($\alpha = 0.05$) affected by drying conditions, with the exception of cohesiveness. Cohesiveness was lower in rice dried at lower temp. (18°C or ambient) than in that dried at the higher commercial temp. Final moisture content and degree of milling significantly ($\alpha = 0.05$) affected textural property values for adhesiveness, cohesiveness, hardness, and springiness; their effects were interdependent. The effects of deep milling were more pronounced in the rice dried to 15% moisture than that dried to 12%. In general, textural property values for hardness were higher and those for cohesiveness, adhesiveness and springiness were lower in regular-milled rice dried to 15% moisture than in that dried to 12%. In contrast, hardness values were lower and cohesiveness, adhesiveness, and springiness values were higher in deep-milled rice dried to 15% moisture than in that dried to 12% moisture. Deep milling resulted in rice with lower hardness values and higher cohesiveness, adhesiveness, and springiness values. AA

Barton (FE), Windham (WR), Champagne (ET) and Lyon (BG). **Optimal geometries for the development of rice quality spectroscopic chemometric models.** *Cereal Chemistry* 75(3); 1998; 315-319

Three sample geometries, 2 different instrument types, and 2 spectral collection modes (reflectance and transmission) were used to assess rice quality and develop chemometric models for composition and sensory characteristics. Rice samples (120) including 3 cvs., 2 growing locations, 5 drying treatments, 2 moisture levels, and 2 levels of milling were scanned in 2 locations. Data collected for modeling included amylose, protein, moisture, whiteness, transparency and milling degree. Taste and texture were determined with the use of separate trained sensory panels. The NIR models show that composition is best modeled in the 1,100-2,500 nm range, while the physical properties of whiteness, transparency and milling degree are best modeled in the 750-1,050 nm range. Additional models were developed using limited data subsets of the spectral data points. In some cases, adequate models were generated with as few as 20 wavelength data points. Results show that no one spectroscopic protocol is best for all analytes in rice and that for any complex food matrix more than one preprocessing or spectral range protocol is needed. AA

Wheat

80

Wikstrom (K) and Eliasson (A-C). **Effects of enzymes and oxidizing agents on shear stress relaxation of wheat flour dough: Additions of protease, glucose oxidase, ascorbic acid and potassium bromate.** *Cereal Chemistry* 75(3); 1998; 331-337

Measuring shear stress relaxation with an established research rheometer after slowly applying large strain proved useful for characterizing the effects of different chemical and enzymatic additives. Baking tests done with and without added ascorbic acid indicated that the method can be used for predicting effects of such additives on breadbaking quality. The relaxation process for dough is discussed in terms of 2 flow processes, one occurring at short time periods and the other at longer time periods. The slowly applied large strain

shear stress relaxation method provides information about stress relaxation behaviour during the second flow process. The effects of 2 enzymes (protease and glucose oxidase) and 2 chemical additives (ascorbic acid and potassium bromate) were studied. The results are presented as the stress relaxation curve with the corresponding rate plot and the initial value of the stress. Addition of the oxidizing agents increased the second flow process times and decreased the relaxation rate during the second process. Protease shortened the second flow process times and increased the relaxation rate during the second process. Glucose oxidase separated the 2 flow processes by increasing the relaxation time of the second process and decreasing the relaxation time of the first process. AA

81

Gaines (CS), Finney (PL), Fleege (LM) and Andrews (LC). **Use of aspiration and the single kernel characterization system to evaluate the puffed and shriveled condition of soft wheat grain.** *Cereal Chemistry* 75(2); 1998; 207-211

Shriveled kernels lower wheat test wt. and reduce milling flour yields. Test wt. is also lowered by rain-dry cycles that cause kernels to puff (exhibit, in part, loosened layers of pericarp). A numeric score was developed for degree of puffing and for degree of shriveling based on simple measurement devices. Wheat samples were evaluated for test wt. and Single Kernel Characterization System (SKCS) hardness index, SKCS kernel wt., milling flour yield, and kernel density (hexane displacement). Those evaluations were performed before and after samples were air-aspirated to remove all shriveled kernels. Test wt., SKCS hardness index, and density of aspirated samples were used to develop a puffing score. Changes (resulting from aspiration) in test wt., SKCS kernel wt., and flour yield were used to develop a shriveling score. Higher puffing scores were related to elevated α -amylase activity. Puffed kernels were softer and were not associated with decreased flour yield. Puffing and shriveling scores were independent (poorly correlated), but together predicted 95% of the variation in original, nonaspirated test wt. AA

82

Matser (AM) and Steeneken (PAM). **Origins of the poor filtration characteristics of wheat starch hydrolysates.** *Cereal Chemistry* 75(3); 1998; 289-293

The effects of wheat starch components on the filtration characteristics of wheat starch hydrolysates were investigated with a model-based approach. The filtration rate was not affected by the removal of the pentosans or by altering the conformation of the protein. On the other hand, the filtration rate increased when a hydrolysate was defatted with chloroform or butanol. Some commercially available enzymes also increased the filtration rate. The filtration rate of potato starch hydrolysates decreased when gluten, pentosans, solubles, or propanol extract from defatted wheat starch were added. The latter had by far the largest effect. The composition of this extract was 65% lipid and 11% protein. The main lipid in wheat starch is lysophosphatidylcholine (LPC). This single-chain lipid forms micelles above a concn. of 0.025 g/kg. The filtration rate decreased when LPC was added to potato starch hydrolysates or glucose solutions at concn. above the critical micelle concn. This effect of LPC on glucose solutions proves that the filtration characteristics are not related to the formation of amylose-lipid complexes. Therefore, micelle formation must be responsible for the effect of LPC on the filtration rate. The critical micelle concn. is only 2.5% of the amount of lysophospholipids in wheat starch hydrolysates. Thus, almost all of these lipids have to be removed from wheat starch hydrolysates to increase the filtration rate. AA

83

Bean (SR), Lyne (RK), Tilley (KA), Chung (OK) and Lookhart (GL). **A rapid method for quantitation of insoluble polymeric proteins in flour.** *Cereal Chemistry* 75(3); 1998; 374-379

The baking properties of several genotypes of US hard wheats grown in state nurseries for the Wheat Quality Council (WQC) were analyzed by the Hard Winter Wheat Quality Laboratory. Flours (250 mg) from each individual line and location were extracted three times with 50% 1-propanol (1 mL) for 5 min each. Samples were vortexed continually during extraction. This method was effective in removing most monomeric proteins. Negligible detectable protein was found in the third extract. Significant amounts of polymeric glutenin were also extracted. Pellets were oven-dried (130°C) for 1 h and analyzed for protein content using N combustion analysis. Protein remaining in the pellet consisted mainly of polymeric protein. The amount of gliadin and soluble polymeric protein could also be measured by separating the supernatant by size-exclusion chromatography. Good correlations

between dough strength parameters and amounts of pellet protein and the relative amount of pellet protein (pellet protein/flour protein) were found for all samples. This procedure was simple and rapid, with the potential of analyzing large numbers of samples per day with good reproducibility. AA

84

Dubreil (L), Meliande (S), Chiron (H), Compoint (J-P), Quillien (L), Branlard (G), Marion (D). **Effect of puroindolines on the breadmaking properties of wheat flour.** *Cereal Chemistry* 75(2); 1998; 222-229

The role of lipid-binding proteins from wheat seed (puroindolines) on the breadmaking properties of wheat flour was investigated by determining the relationship between breadmaking quality and puroindoline content in samples of 32 wheat cvs. An inverse relationship was mainly explained by the link between hardness and puroindoline contents. This link is in agreement with previous results which have shown a close structural identity between basic friabilins and puroindolines. Next, the effect of puroindolines in breadmaking was investigated by performing reconstitution experiments with two puroindoline-free hard cvs. of opposite quality (Florence Aurore and Ecrin) as indicated in the screened wheat sample. Addition of 0.1% puroindolines to these flours drastically modified both the rheological properties of doughs and the structure of the bread crumb. Puroindolines are essential to the foaming properties of dough liquor, and a close relationship was found between the fine grain crumb provided by reconstituted flours with puroindolines and the fine structure of corresponding dough liquor foams. The effect of puroindolines on bread vol. was mainly related to the rheological properties of wheat doughs. AA

85

Martin (C), Herrman (TJ), Loughin (T) and Oentong (S). **Micropycnometer measurement of single-kernel density of healthy, sprouted, and scab-damaged wheats.** *Cereal Chemistry* 75(2); 1998; 177-180

Samples from 4 market lots of hard red winter and soft red winter wheat containing sprout- and scab-damaged kernels were used to test a prototype single-kernel density micropycnometer. Fifteen kernels for each damage type and an equal number of healthy kernels were weighed to the nearest 0.01

mg, then measured for vol. to the nearest 1.0 μL . Vol. measurements for all kernels were performed three consecutive times with the micropycnometer, then kernels were evaluated for wt., size, moisture and hardness using a Single Kernel Characterization System. The structure of the sampling plan and the goals of the study indicated that a mixed-model statistical analysis was needed. The fixed effects were wheat class and type of kernel, and the random effects included lot, the interaction of lot with class and kernel type, kernels within each lot, and repeated measures of single-kernel density. Results indicated that variability of the 3 measurements per kernel did not depend on type of kernel or class of wheat. The standard deviation for repeated density measurements was 0.0029 g/cm^3 . Kernel-to-kernel variability changed depending on the type of kernel; healthy and sprout-damaged kernels showed similar variability in density, whereas scab damaged kernels had a variance about four to five times higher. Type of kernel significantly affected mean density; healthy kernels averaged 1.28 g/cm^3 , sprout-damaged kernels averaged 1.19 g/cm^3 , and scab-damaged kernels averaged 1.08 g/cm^3 . Wheat class did not exert a significant influence on single-kernel density. Attempts to predict single-kernel density using kernel wt., size, moisture, and hardness found no relationships of practical importance. AA

86

Lena (GD), Patroni (E) and Quaglia (GB). **Improving the nutritional value of wheat bran by a white-rot fungus.** *International Journal of Food Science and Technology* 32(6); 1997; 513-519

This investigation was concerned with the solid-state cultivation of the white-rot fungus *Lentinula edodes* on wheat bran and its impact on the nutritional value of the substrate. A considerable reduction (60%) in the concn. of the phytic acid of wheat bran was detected after 7 days of incubation, but no further reduction was observed during the following wks. Protein digestibility increased gradually during the first 3 wks. of incubation reaching a max. (82%) at day 20. Hydrolytic and oxidative exoenzymes, such as phytase, endocellulase and polyphenol oxidase, were released by the mycelium during the colonization of the substrate. Total and insoluble dietary fibre and crude protein content in bran increased with fungal growth while the *in vitro* dry matter enzyme digestibility decreased. AA

87

Seguchi (M) and Kanenaga (K). **Structure of lysophosphatidylglyceryl-Remazolbrilliant blue (LPG-RBB) from the surface of dyed wheat starch granules.** *Cereal Chemistry* 75(3); 1998; 294-296

Wheat starch granule surface was covalently stained with Remazol-brilliant blue-R dye (RBB) and then extracted with 1% SDS containing 1% 2-mercaptoethanol (2-ME) at room temp. for 14.5 h. The extracted blue-staining material (A_{650}) separated into two fractions. Low mol. wt. (LMW) material was further purified by Sephadex G-75 size-exclusion chromatography and thin-layer chromatography. Infrared and nuclear magnetic resonance (^1H -NMR and ^{13}C -NMR) spectroscopy indicated that the structure of the purified LMW material was 18-O- (6-lyso phosphatidyl glyceryl) - RBB. AA

88

Stapley (AGF), Gladden (LF) and Fryer (PJ). **A differential scanning calorimetry study of wheat grain cooking.** *International Journal of Food Science and Technology* 32(6); 1997; 473-486

A number of commercial processes involve whole grain cooking. In this study, differential scanning calorimetry (DSC) scans were taken of whole wheat grains that had been boiled or steamed for various times at either 100°C or 120°C. Scans were also taken of raw grains that had been soaked and equilibrated to different moisture contents. Raw grains showed peak temp. to be dependent on moisture content, in close agreement with literature data for wheat starch/water mixtures. The two cooking methods showed different behaviour, which can be explained with reference to magnetic resonance imaging (MRI). For steamed grains with high moisture contents at longer cooking times, part of the DSC endotherm was below the cooking temp. and conversion occurred in the cooker. DSC endotherms of steamed grains showed a clearly defined onset temp., c. 6°C above the steam temp., due to the release of latent heat. MRI shows partially boiled grains to have a high moisture content in the outer regions and an inner core of lower moisture content. The peak temp. observed by DSC were similar to those expected of soaked grains with the same moisture contents as that of the core. It is postulated that the inner core contains unconverted starch, and that conversion has been achieved in the outer regions. The specific heat capacity for each

grain was also measured, and correlated well with moisture content, but was not strongly influenced by the grain treatment. AA

89

Gaines (CS) and Windham (WR). **Effect of wheat moisture content on meal apparent particle size and hardness scores determined by near-infrared reflectance spectroscopy.** *Cereal Chemistry* 75(3); 1998; 386-391

The AACC Approved Method for NIRs spectroscopy to produce a wheat hardness score for wheat market classification can be corrected for variation in wheat moisture content. The cause of the variation in NIR spectra resulting from variation in wheat moisture was investigated. Ten samples each of soft red winter, soft white winter, hard red winter, and hard red spring wheats were stored at 20, 40, 60 and 80 equilibrium RH. Wheats were then ground on a cyclone grinder as required by the standard method. Variation in unground wheat kernel moisture content resulted in variation in NIR data. NIR log 1/reflectance values increased at all wavelengths as wheat moisture content increased. Spectral changes were related to changes in the apparent particle size of ground wheat meal as it was influenced by moisture content. Higher moisture contents produced slightly higher apparent particle size in meal, suggesting larger particles of pericarp that became more pliable at higher moisture (temper) levels. The apparent particle size of meal of high moisture wheats resulted in greater NIR radiation scattering and decreased reflectance. Meal moisture content itself had no effect on the two NIR wavelengths used to evaluate wheat hardness. AA

90

Singh (N), Cairns (P), Morris (VJ) and Smith (AC). **Physical properties of extruded wheat starch-additive mixtures.** *Cereal Chemistry* 75(3); 1998; 325-330

The effects of the addition of fatty acids, monoglycerides (MG) and wheat germ oil (WGO) on the level of crystallinity and the crystalline structure of extrusion-cooked wheat starch have been studied using twin-screw extruders. Measurements of water solubility and water absorption indices were made on the extrudates, together with specific mechanical energy (SME) consumption and die pressure for the extruder. MG and the fatty acids added to a level of

4% caused an increase in Vhydrate type crystallinity. WGO addition to a level of 8% caused no change in crystallinity, although the Ehydrate type was favoured at lower moisture contents. All additives caused a decrease in SME and an increase or max. in die pressure. WGO behaved differently than MG and fatty acids in that its addition caused the water solubility index and expansion to increase, as previously observed for other oils added to flours. AA

91

Fang (Q), Biby (G), Haque (E), Hanna (MA) and Spillman (CK). **Neural network modeling of physical properties of ground wheat.** *Cereal Chemistry* 75(2); 1998; 251-253

Physical properties of ground materials from roller mills are affected by the characteristics of wheat and the operational parameters of the roller mill. Back propagation neural networks were designed, trained, and tested for the prediction of three physical properties of ground wheat: geometric mean diam. (GMD), specific surface area increase (SSAI), and break release (BR). Eight independent variables were used as input data. Compared to conventional statistical models, the accuracy of prediction was improved substantially, as reflected by the significant reduction in root mean squared error (RMS), relative error (RE), and the increase in coefficient of detn. R^2 (0.98). The neural network models are, therefore, capable of predicting the physical properties of the ground wheat. AA

MILLETS

Corn

92

Batterman-Azcona (SJ) and Hamaker (BR). **Changes occurring in protein body structure and α -zein during cornflake processing.** *Cereal Chemistry* 75(2); 1998; 217-221

Zeins, which comprise the majority of proteins in corn, are located in spherical organelles called protein bodies. Changes in protein body shape and release of encapsulated α -zeins as a result of cornflake processing (conventional pressed or extrusion flaking) were investigated. Size exclusion chromatography, SDS-PAGE, and protein solubility

tests showed that, upon cooking, zein proteins form large, disulphide-bound polymers, many of which were insoluble in nonreducing solvents. Transmission electron microscopy with immunogold staining revealed that cooking had no effect on protein body structure in corn, but after processing to cornflakes, protein body structure was altered. In conventional pressed cornflakes, the protein bodies were flattened, partially fused together, and α -zeins were to some degree released, whereas in the extruded flakes. Protein bodies were completely disrupted and α -zeins dispersed. These results suggest that zeins in cornflakes, particularly extruded ones, are not confined to rigid protein bodies but can interact with each other and other components in the system. The disruption of protein bodies, zein release, and the chemical changes that proteins undergo during processing are speculated to be determinants of texture in ready-to-eat corn-based breakfast cereals. AA

93

Singh (V), Haken (AE), Niu (YX), Zou (SH) and Eckhoff (SR). **Wet-milling characteristics of selected yellow dent corn hybrids as influenced by storage conditions.** *Cereal Chemistry* 75(2); 1998; 235-240

Three yellow dent corn hybrids (FR1064xLH59, FR600xFR1087, and FR618xLH123HT) from the 1994 crop, one hybrid (FR1064xLH59) from the 1995 crop, and two hybrids (FR1064xLH59 and FR618xLH123HT) from the 1996 crop were used to study the effect of storage time and storage temp. on starch yields. Samples of all of the corn hybrids were stored under one of two conditions: in a 4°C cold room or under a shed exposed to ambient conditions. The hybrids from the 1994, 1995, and 1996 crops were stored for up to 24, 12 and 3 months, respectively. No significant differences were found between starch yields of the hybrids with respect to storage time. However, there was a significant difference in hybrids from the 1994 samples. Starch yields of two of the three corn hybrids (from the 1994 crop) stored in the 4°C cold room were higher when compared to the starch yields of the same hybrids stored at ambient conditions. AA

94

Dijkhuizen (A), Dudley (JW), Rocheford (TR), Haken (AE) and Eckhoff (SR). **Near-infrared reflectance correlated to 100-g wet-milling analysis in maize.** *Cereal Chemistry* 75(2); 1998; 266-270

An understanding of the genetic control of starch, protein, and oil concn. in the corn (*Zea mays* L.) kernel is essential for improvement of grain quality. Because large numbers of progenies are needed for genetic studies, a rapid, accurate, analytical procedure is necessary. As part of a study to identify chromosomal regions associated with starch and protein, a rapid near-infrared reflectance (NIR) method and a more labor-intensive 100 g wet-milling procedure were compared for consistency in ranking families and identifying quantitative trait loci (QTL) using a set of 200 F₂S₁ families from the cross of the 70th generations of the Illinois High Protein (IHP) x Illinois Low Protein (ILP) corn strains. NIR starch and wet-milling starch values were highly correlated ($r = 0.80$), as were NIR protein and gluten measured by wet-milling ($r = 0.72$). Chromosomal regions associated with NIR starch and wet-milling starch were generally the same. Fiber concn. was significantly negatively correlated with starch and positively correlated with protein. Chromosome regions with significant associations with starch also had significant associations with fiber. The NIR method is satisfactory for measuring starch and protein in material with a wide range of variability in the early stages of a corn-breeding program. AA

95

Carriere (CJ). **Evaluation of the entanglement molecular weights of maize starches from solution rheological measurements.** *Cereal Chemistry* 75(3); 1998; 360-364

The entanglement mol. wts. of waxy maize (WM) and normal maize (NM) starches were calculated from solution rheological data. The viscoelastic behaviour of both WM and NM starches were measured at several different concn. and then shifted to produce a master curve for each of the materials. The theory of Doi and Edwards was used to calculate the plateau moduli from which values for the entanglement mol. wts. for WM and NM starches were calculated. The entanglement mol. wts. were 100 plus or minus 15 kg/mol for WM starch and 96 plus or minus 8 kg/mol for NM starch. These two values were within experimental error of one another and represent the entanglement mol. wt. of amylopectin, the major component of WM and NM starches. The entanglement degrees of polymerization for WM and NM starch, using a value of 162 g/mol for the monomer mol. wt. of amylopectin, were 617 plus or minus 92 and 592 plus or minus 49, respectively. The values for the entanglement mol. wt. and the entanglement

degrees of polymerization for WM and NM starch were markedly higher than those quoted for many commercial polymers. This finding indicates that mol wts. of > 1 million are required to produce starch-based materials with consistent physical properties. AA

96

Akuzawa (S), Sawayama (S) and Kawabata (A). **Thermal properties of corn amylose incorporating or with added free fatty acid.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 487-490

97

Singh (N), Smith (AC) and Frame (ND). **Effect of process variables and monoglycerides on extrusion of maize grits using two sizes of extruder.** *Journal of Food Engineering* 35(1); 1998; 91-109

The effect of moisture, temp. and addition of monoglycerides (MG) on the extrusion behaviour of maize grits was studied using laboratory (MPF-19) and pilot scale (MPF-50) extruders, which were operated under conditions of scale up by throughput and die size. The extruder responses of pressure, torque and SME and the extrudate properties of expansion and water solubility and absorption indices were measured and compared in the two scales of extruder. Die pressure and torque (expressed as a percentage of max.) of the MPF-50 extruder were higher compared to those of the MPF-19 extruder; however, the reverse was true for SME, expansion and water solubility index of extrudates. However, the general applicability of these results may depend on feedstock particle size because of scale up of the screw-barrel gap. AA

98

Lai (H-M) and Padua (GW). **Water vapour barrier properties of zein films plasticized with oleic acid.** *Cereal Chemistry* 75(2); 1998; 194-199

Water sorption, water vapour permeability (WVP), and tensile properties were evaluated for zein films plasticized with oleic acid. The effect of RH on WVP and tensile properties of films was investigated. Samples were produced by 2 different methods: casting from a zein solution and stretching from a zein-fatty acid resin. Films were also coated with linseed oil. Results indicated that preparation method affected water sorption than cast films,

especially at high a_w values. WVP was also lower for resin films. Coating with linseed oil further improved water vapour barrier ability of resin films. Permeability was affected by environmental RH; higher RH resulted in increased permeability. Environmental RH also affected tensile properties of resin films. Toughness and elongation were improved when RH increased from 50 to 85% RH. Tensile strength showed a max. at 75% RH. Coating improved elongation and toughness of films. Max. elongation and toughness were observed for coated samples at 85% RH. Zein resin films showed good tensile and water barrier properties that were maintained through environmental humidity levels from 50 to 98% RH. AA

99

Suhendro (EL), Almeida-Dominguez (HD), Rooney (LW) and Waniska (RD). **Objective rollability method for corn tortilla texture measurement.** *Cereal Chemistry* 75(3); 1998; 320-324

An objective rollability method that imitates subjective rollability scores or corn tortilla texture was developed. Force and work required to pull an axle that caused a tortilla to roll around a dowel were measured. The sensitivity of the technique to detect changes in corn tortilla texture during storage was evaluated, and other factors affecting objective rollability and tortilla texture were studied. The objective rollability technique was fast, simple and sensitive to changes in the tortillas, and worked effectively on commercial samples. Data was significantly correlated to subjective rollability and flexibility scores. Textural differences among fresh tortillas during the first 24 h of storage, and among tortillas with different thicknesses and additives, were detected by the objective rollability method. Thicker tortillas required more force and work to roll than thin tortillas. The objective technique is more sensitive to changes in texture than subjective evaluations, which do not detect differences in tortilla variability during the first 24 h after baking, and it can be used to evaluate the effect of formulation and processing changes on fresh and stored tortillas. AA

Sorghum

100

Suhendro (EL), McDonough (CM), Rooney (LW), Waniska (RD) and Yetneberk (S). **Effects of processing conditions and sorghum cultivar on**

Sorghum (*Sorghum bicolor* (L.) Moench) grain was boiled or autoclaved in alkali, washed, drained, and dried into shelf-stable half-products (pellets). The pellets were deep-fat fried to produce a crunchy snack product. Effects of cooking time, drying method (pellet moisture content), and sorghum cv. on unfried and fried pellets were evaluated. Increasing the alkaline cooking time from 30 to 60 min decreased the yield of the pellets from 96 to 84% (on a dry wt. basis). Cooked sorghum dried at room temp. (24°C) for 18 h, followed by oven-drying at 50°C for an additional 18 h, produced pellets with a low moisture content (less than or equal to 5%), that required a higher frying temp. (greater than or equal to 220°C). However, cooked sorghum dried at room temp. for 18 h followed by oven drying at 50°C for 5 h produced pellets with 9% moisture and a lighter-density highly acceptable product when fried at 220°C. Fat content of fried pellets averaged 18%. The optimum method for producing a light, crunchy, fried product was cooking for 60 min, drying to 9% moisture, and frying at 220°C. ATx631*Tx436, the hardest endosperm-texture sorghum used in the study, had the highest unfried and fried pellet yields. Dorado, an intermediate-to-soft endosperm-texture sorghum, and ATxArg-1*Tx2907, a waxy sorghum, had lower yields. The fried pellets produced from Dorado and waxy sorghum (ATxArg-1*Tx2907) were more expanded than those produced from ATx631*Tx436. AA

101

Maha Lakshmi (R) and Sumathi (S). **Binding of iron, calcium and zinc by fibre of sorghum and ragi.** *Food Chemistry* 60(2); 1997; 213-217

Fe, Ca and Zn binding by flour, bran and neutral detergent fibre (NDF) of sorghum and ragi were investigated *in vitro*. The percentages of added Fe, Ca and Zn bound by sorghum NDF were 54%, 88% and 67.5%, resp. and bound by ragi NDF were 59.6%, 88.8% and 65.6% resp. Brans were dephytinized by treatment with HCl acid and the effect of phytate hydrolysis of brans on the Fe-, Ca- and Zn-binding capacity of brans was tested. Brans treated with HCl acid bound more Fe, Ca and Zn than native brans. NDFs of sorghum and ragi were treated with proteases to assess the contribution of fibre-bound protein to mineral-binding capacity. The contribution of fibre-bound protein 9.6% in sorghum and 19% in ragi for Zn binding. Ascorbic acid, one of

the most potent inhibitors of Fe binding, could release the bound Fe from Fe-fibre suspensions of both sorghum and ragi. AA

PULSES

Cowpeas

102

Enwere (NJ), McWatters (KH) and Phillips (RD). **Effect of processing on some properties of cowpea (*Vigna unguiculata*) seed, protein, starch, flour and akara.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 365-373

Large brown eye kano white cowpea (*Vigna unguiculata*) seeds (CS) were processed into 3 batches of flour by wetting, drying individually at 30, 80 and 120°C, decorticating and dry milling. Starch was extracted from the CS and protein from the flour using water as solvent. The microstructure of the cowpea cotyledon, flour, starch and akara (fried paste) crumb were examined with SEM. Observation showed that some of the protein fractions from the sample extracted from 30°C dried cowpea were absent. In the samples extracted from the 80 and 120°C dried cowpeas their quantities had decreased. No difference was observed in the microstructure of the 3 flour samples except in the size and shape of the starch granules (SG) and particles of protein and cell wall material. The SG from the cowpea dried at 120°C had surface defects. Cavities occurred in the cotyledons of the 80 and 120°C dried CS, some starch granules; protein matrix and sometimes the entire cell contents were lost from the cell. The protein sheet in the akara crumb became thicker as temp. increased to 80 and 120°C. SRA

Faba beans

103

Otegui (I), Fernandez-Quintela (A), Diego (AD), Cid (C), Macarulla (MT), Partearroyo (MA). **Properties of spray-dried and freeze-dried faba bean protein concentrates.** *International Journal of Food Science and Technology* 32(6); 1997; 439-443

A protein conc. from faba bean seeds was prepared by isoelectric precipitation and spray-dried. Its functional properties were measured and the results

obtained were compared to those from another conc. prepared by the classical freeze-drying technique. The functional properties were found to be indistinguishable. However, the protein solubility profile was different depending on the preparation technique. Some antinutritional factors (trypsin inhibitors, tannins and phytates) were also analysed. Both protein conc. showed lower concn. of tannins and phytates than the seeds. AA

OILSEEDS AND NUTS

Soybeans

104

Besson (I), Creuly (C), Gros (JB) and Larroche (C). **Pyroazine production by *Bacillus subtilis* in solid-state fermentation on soybeans.** *Applied Microbiology and Biotechnology* 47(5); 1997; 489-495

2,5-Dimethylpyrazine (2,5-DMP) and tetramethylpyrazine (TTMP) were produced using *Bacillus subtilis* IFO 3013 grown on soybeans. Solid-state cultivations were carried out either in 100 ml bottles or in a fixed-bed column reactor, both systems being at 27°C. Optimization studies showed that the best way to produce the two above aroma compounds involved two separate processes. 2,5-DMP was obtained using soybeans enriched with 75 g threonine/kg initial dry wt. (i.d.w.), giving 0.85 g metabolite/kg i.d.w. after 6 days. TTMP production involved addition of 90 g/kg i.d.w. acetoin to soybeans, and 2.5 g/kg i.d.w. was recovered after 14 days. These results demonstrated the suitability of solid-state cultivation for production of high-added value compounds. AA

105

Katz (F). **That's using the old bean.** *Food Technology* 52(6); 1998; 42-43

Discusses the new understanding of the protein structure of soy and the resulting physiological effects on human health has increased the reasons for genetically engineering soy to provide more helpful materials in the bean. CSA

Soy products

Soy milk

106

Kikuchi-Hayakawa (H), Onodera (N), Matsubara (S), Yasuda (E), Shimakawa (Y), Ishikawa (F). **Effects of soy milk and bifidobacterium-fermented soy milk on plasma and liver lipids, and faecal steroids in hamsters fed on a cholesterol-free or cholesterol-enriched diet.** *British Journal of Nutrition* 79(1); 1998; 97-105

The effects of freeze-dried soy milk (SM) and Bifidobacterium-fermented soya milk (FSM) on plasma and liver lipids, and faecal steroid excretion were estimated in hamsters fed on a cholesterol-free (CFD) or cholesterol-enriched diet (CED). Hamsters fed on the cholesterol-free diet containing 300 g FSM/kg had lower levels of plasma VLDL + LDL cholesterol than the animals fed on the control diet. SM in the diet produced a similar pattern without significant differences. In the CED group, SM and FSM decreased the levels of plasma total cholesterol and VLDL + LDL-cholesterol. SM and FSM decreased the plasma triacylglycerol level in both the CFD and CED diet groups. The liver total cholesterol contents in the SM and FSM groups were lower than that in the control group, for hamsters fed on the CFD. The liver triacylglycerol content was not modified by SM or FSM in hamsters fed on either the CFD or CED. SM and FSM increased the total bile acid excretion and the proportion of cholesterol entering the cholic acid biosynthesis pathway in both the CFD and CED groups. SM and FSM did not affect neutral steroid excretion in the CFD or CED group. There was an inverse relationship between VLDL + LDL-cholesterol and faecal bile acid excretion in hamsters fed on the CFD ($r -0.670$, $P < 0.01$) and CED ($r -0.761$, $P < 0.001$) diets respectively. These results indicated that SM had an anti-atherogenic effect, and that this effect was not diminished by prior fermentation. AA

Tempe

107

Wiesel (I), Rehm (HJ) and Bisping (B). **Improvement of tempe fermentations by application of mixed cultures consisting of *Rhizopus* sp. and bacterial strains.** *Applied Microbiology and Biotechnology* 47(3); 1997; 218-225

Tempe fermentations using mixed cultures of *Rhizopus oligosporus* MS5, *R. oryzae* EN, *Citrobacter freundii* and *Brevibacterium epidermidis* were investigated. Consumption of 150 g tempe, produced with a pure fungal mixed culture out of strains MS5 and EN, is sufficient to cover the daily requirements of niacin, vitamin K, ergosterol, and tocopherol as well as half of the daily requirement of pyridoxine, riboflavin, and biotin. Moreover, one-fourth of the recommended amount of folate is supplied. Supplementation of the fungal inoculum with *C. freundii* results in tempe enriched with vitamin B₁₂. Menachinone was produced as a typical bacterial vitamin K derivative. Metabolic activity of *C. freundii* led to an additional decrease of the α -galactosides stachyose and raffinose compared to pure fungal fermentations. No bacterial formation of factor 2 could be observed. AA

Soy proteins

108

Sakono (M), Fukuyama (T), Ni (W-H), Nagao (K), Ju (H-R), Sato (M), Sakata (N), Iwamoto (H), Imaizumi (K). **Comparison between dietary soybean protein and casein of the inhibiting effect on atherogenesis in the thoracic aorta of hypercholesterolemic (ExHC) rats treated with experimental hypervitamin D.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 514-519

109

Dybowska (BE) and Fujio (Y). **Optical properties of the pre-gel and gel state of soy proteins gelled by GDL under different physical conditions.** *Journal of Food Engineering* 35(4); 1998; 471-482

Aggregation/gelation of the SPI-GDL system was continuously monitored by a colorimeter (Chroma Meter, CR-100, Minolta Co.). Changes in tristimulus values L^* , a^* and b^* as affected by temp., preheat treatment, protein and coagulant concn. were investigated. Observed L^* gelation curves were well approximated by first-order reaction kinetics. Lightness L^* of the gelled material was not greatly influenced by any of the above-mentioned parameters except preheat treatment. Increasing protein concn. decreased the rate of gelation, while the other parameters enhanced it. Values a^* and b^* may be related to the size of the aggregating protein particles. AA

Vegetables

110

Ramesh (MN), Sathyanarayana (K) and Girish (AB). **Biphasic model for the kinetics of vegetable cooking at 100°C.** *Journal of Food Engineering* 35(1); 1998; 127-133

The biphasic model was applied for determining the time domains in which the two reaction rate constant operate. The point of changeover was determined at which the slopes of the two reaction rate constants intersect. These changeover points were at 6, 8 and 10 min of cooking at 98 plus or minus 2°C, for green peas, carrot and knol-khol respectively. It was interesting to note that radish did not have any changeover point. These observations also confirmed the findings of earlier work, that there are two substrates S_1 and S_2 which provide skeletal rigidity to the vegetables. These findings are important to decide the operating parameters in the blanching of vegetables as preprocessing. AA

Asparagus

111

Amaro-Lopez (MA), Zurera-Cosano (G) and Moreno-Rojas (R). **Trends and nutritional significance of mineral content in fresh white asparagus spears.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 353-363

Variations in the Cu, Fe, Zn, Mn, Ca, Mg, Na, K and P content of fresh white asparagus (*Asparagus officinalis*, L.) as a function of the spear portion and the differences between var. (Desto and Cipre's) and thickness (< 11 and > 14 mm) of asparagus were investigated. The higher % of mineral recommended dietary allowances (RDAs) were found in apical portion. There was diminishing distribution of the mineral content throughout the spear and significant differences for the majority of the mineral elements (ME) between var. and thickness were found, and these differences were minimal, and did not have any nutritional significance since the mineral RDAs % supplied were similar. Nutrient density was over 100% for all the elements, except for Na. These results confirm that asparagus is an adequate food source of ME. SRA

112

Desobry (SA), Netto (FM) and Labuza (TP). **Preservation of β -carotene from carrots.** *CRC Critical Reviews in Food Science and Nutrition* 38(5); 1998; 381-396

In this article, the various sp. of carotene in carrots are briefly described and the different ways used to preserve β -carotene are compared. Carotene in carrots (carotene sp. in carrots, a protein-carotenoid complex in carrots), analysis of carotene retention (spectrometry, HPLC, L, a, b chromameter), carotene retention in carrots during storage (freezing, drying: air drying, freeze-drying, canning), preservation of purified carotene from carrots (extraction of carotene: aqueous extraction, supercritical fluid extraction, instability of pure β -carotene; preservation of β -carotene by microencapsulation) are the aspects covered. SRA

Leafy vegetables

Amaranthus

113

Baker (LA) and Rayas-Duarte (P). **Freeze-thaw stability of amaranth starch and the effects of salt and sugars.** *Cereal Chemistry* 75(3); 1998; 301-307

Freeze-thaw stability of amaranth, corn, wheat and rice starches was determined measuring the percent of syneresis by centrifugation. Thermal properties were calculated by differential scanning calorimetry (DSC). The effects of salt (NaCl at 2 and 5%) and sugars (sucrose, glucose and fructose at 10, 20 and 30%) on the freeze-thaw stability of amaranth starch were also studied. Based on DSC and centrifugation methods, amaranth starch had better stability after freezing and thawing through four cycles than did corn, wheat, and rice starches. Amaranth starch with added salt showed similar stability as compared with a control when measured by centrifugation and showed increased stability when measured by DSC. Adding sugars to amaranth starch gels had varying results, but for the most part, they showed similar or increased stability when compared with a control. AA

114

Baker (LA) and Rayas-Duarte (P). **Retrogradation of amaranth starch at different storage temperatures and the effects of salt and sugars.** *Cereal Chemistry* 75(3); 1998; 308-314

The retrogradation of amaranth, corn, wheat and rice starches at different storage temp. (-20, 4 and 25°C) was measured by differential scanning calorimetry (DSC), NaCl (2 and 5%), glucose, sucrose and fructose (10, 20 and 30%) were added to amaranth starch gels. The retrogradation was measured as the percent of gelatinization enthalpy (ΔH_g) of the retrograded gel when compared to the original nonretrograded sample. The data were analyzed fitting an exponential first-order equation by regression, assuming a first-order process. A modified equation was used for the data that showed several days of lag time before retrogradation was observed. Retrogradation percentage of amaranth gels at all 3 storage temp. was lower than those of corn, wheat or rice starches. Amaranth starch showed approx. 2-9 times slower retrogradation rates than corn, wheat, and rice starches at 4 and -20°C, and up to approx. 2.8 times lower max. percent of retrogradation than the other starches at all 3 temp. After 21 days, amaranth, corn, and wheat starches exhibited the highest retrogradation (45, 77 and 67%, respectively) at 4°C, compared to 25 and -20°C. Rice starch had a higher retrogradation percentage (55%) at -20°C, compared to 25 and 4°C. The percent of retrogradation of gels with 5% NaCl addition decreased approx. 2 and 1.7 times at 25 and 4°C, respectively, and increased approx. 1.2 times at -20°C, compared to the control. The addition of sugars had similar effects in reducing retrogradation at 25 and 4°C and increasing retrogradation at -20°C when compared to samples with no sugar added. AA

115

Radosavljevic (M), Jane (J) and Johnson (LA). **Isolation of amaranth starch by diluted alkaline-protease treatment.** *Cereal Chemistry* 75(2); 1998; 212-216

Starch was isolated from *Amaranthus cruentus* seeds by different alkaline treatments and combinations of low alkaline steeping and protease treatments. For low alkaline-protease treatments, amaranth seeds were steeped in a NaOH sol. (0.05%, pH 12) for 22 h to loosen the protein matrix and ground. The pH of the ground slurry was adjusted to 7.5 and subjected to a protease (from

Aspergillus sojae) treatment. The slurry was incubated with 1 or 0.5% of the protease (based on total amount of seeds) for 2 h at 37°C and 50 rpm. The starch was then isolated by screening and centrifugation. This method produced starch with a low protein content (less than or equal to 0.2%) and a high recovery (approx. 80%). Amaranth starch isolated by alkaline treatments were also studied by using various concn. of NaOH steeping solutions and with or without alkaline solution during grinding and washing. The properties of amaranth starch isolated by alkaline and low alkaline-protease treatments were analyzed and compared. The properties of the amaranth starch were also compared with those of normal and waxy maize starches. AA

116

Pollio (ML), Tolaba (MP) and Suarez (C). **Measuring and modeling grain sorption equilibria of amaranth grains.** *Cereal Chemistry* 75(3); 1998; 297-300

Water activity (a_w) of *Amaranthus cruentus* were measured at 35, 45 and 65°C at different moisture contents by means of an electronic a_w meter. Experimental curves were fitted to one three-parameter equation (GAB equation). The equilibrium values and temp. shifts were modeled with a three-parameter equation in the approx. a_w range of 0.03-0.88. An analytical expression to calculate the isosteric heat of sorption and its moisture content dependence was used, and the results were compared with the isosteric heat calculated from the experimental equilibrium data by means of the Clausius-Clapeyron equation. AA

Onions

117

Vaidya (PS), Sharma (NV), Thangaraj (M) and Jaiswal (PK). **Assessment of organo-chlorine pesticide (Lindane) residue in onion.** *Beverage and Food World* 25(5); 1998; 32

During the preliminary experiments, it was observed that S-compounds from the onion interfered in analysis with GC. This interference was reduced to a large extent by using 2% benzene in n-hexane as eluant instead of ether-solvent ether eluant during the column clean-up procedure. After standardising the test conditions, sample extract were injected to assess the presence and level of the pesticide. It was

observed that none of the samples gave the characteristic lindane peak at the desired retention time indicating the absence of lindane under the test conditions. SRA

Potatoes

118

Kamasaka (H), To-o (K), Kusaka (K), Kuriki (T), Kometani (T), Hayashi (H), Okada (S). **The structures of phosphoryl oligosaccharides prepared from potato starch.** *Bioscience, Biotechnology and Biochemistry* 61(2); 1997; 238-244

In the previous study, it was proposed that phosphoryl oligosaccharides (POs) prepared from potato starch had an inhibitory effect on the formation of a Ca phosphate precipitate *in vitro*. In this study, the structures of the phosphoryl oligosaccharide-1 (PO-1) fraction that was the main component of POs was investigated. By treating with bacterial saccharifying α -amylase (BSA) after glucoamylase (GA), the PO-1 fraction produced 3²-phosphoryl maltotriose from 3-phosphoryl oligosaccharides, and 6³-phosphoryl maltotriose from 6-phosphoryl oligosaccharides. These products were characterized spectrometrically as well as chemically, including measurement of the amounts of the non-reducing-terminal residue, reducing-terminal residue, and organic phosphate. A small amount of 6²-phosphoryl maltose was also detected after treating with GA alone, indicating that 6²-phosphoryl maltotriose existed in the PO-1 fraction. According to the reaction specificities of GA and BSA, it was concluded that the PO-1 fraction was made up of 3-phosphoryl oligosaccharides (3³-phosphoryl maltotetraose and 3⁴-phosphoryl maltopentaose) and 6-phosphoryl oligosaccharides (6³-phosphoryl maltotriose, 6²-phosphoryl maltotriose, 6³-phosphoryl maltotetraose, and 6⁴-phosphoryl maltopentaose). AA

Tomatoes

119

Abushita (AA), Hebshi (EA), Daoood (HG) and Biacs (PA). **Determination of antioxidant vitamins in tomatoes.** *Food Chemistry* 60(2); 1997; 207-212

This study was conducted to investigate the antioxidant vitamin (vitamin E, vitamin C and β -carotene) content of one of the most important

vegetables, tomato, using modern analytical techniques. HPLC procedures allowed the separation and quantification of these vitamins as well as their analogues in different cvs. Carotenoid extract could be fractionated into 14 components, including lycopene, β -carotene and lutein as the major ones. Paired-ion liquid chromatography provided excellent separation of ascorbic acid with high peak purity. In addition to different analogues of tocopherol, ubiquinone-10 could also be separated and sensitively detected by normal-phase chromatography and fluorescence detection. The highest concn. ($3.15\text{--}3.98\text{ }\mu\text{g g}^{-1}$) of total tocopherol (mainly α -analogue) were found in tomato fruits of Katinka, Gitana and Floriset cvs. The vitamin C content was maximal ($36\text{--}48\text{ mg/100 g}$) in DRW 3126, Primato, Tampo and Monika cvs. The highest values for β -carotene were found in Monika, Ultimo and Falcato cvs. ($3.5\text{--}3.9\text{ }\mu\text{g g}^{-1}$). The dynamics of fruit ripening were also examined. AA

120

Porretta (S) and Poli (G). **Tomato puree quality from transgenic processing tomatoes.** *International Journal of Food Science and Technology* 32(6); 1997; 527-534

The quality of tomato puree prepared from transgenic fruits (*Lycopersicon esculentum*) which had reduced amounts of polygalacturonase (PG) activity, were evaluated. The application of genetic modification yields products which have lower Bostwick consistency values (from 35 to 55%), reduced serum separation (c. 40%) and better sensory appearance and acceptability in comparison with their conventional counterparts. A new way of producing high quality tomato products using genetically modified fruits together with mild heat treatments is described. AA

FRUITS

121

Shantha Krishnamurthy and Rao (DVS). **Research and developments in modified atmosphere packaging and controlled atmosphere storage of fruits and vegetables.** *Beverage and Food World* 25(5); 1998; 11-13

The role of modified atm. packaging (MAP) and controlled atm. storage (CAS). CAS vs MAP, developments in CA and MA storage systems,

development of high gas permeability package films, development of active packaging technologies, tailoring of plastic film laminates, individual seal/shrink packing technique, the major obstacles for implementing the MA technology in consumer packages of fresh fruits and vegetables, and future research needs are discussed. SRA

122

Williamson (G), DuPont (MS), Wanigatunga (S), Heaney (RK), Musk (SRR), Fenwick (GR), Rhodes (MJC). **Induction of glutathione S-transferase activity in hepG2 cells by extracts from fruits and vegetables.** *Food Chemistry* 60(2); 1997; 157-160

The human hepatoma cell line, hepG2, retains many of the xenobiotic metabolising enzymes found in normal hepatocytes, including an inducible glutathione S-transferase (GST). The isoform of GST that is induced by xenobiotics in this cell line is GSTA1-1. As a first step to determining the effect of diet on induction of GST in humans, have examined the ability of extracts from a wide var. of fruits and vegetables to induce GST activity in hepG2 cells were examined. Extracts from cruciferous vegetables (broccoli, Brussels sprouts, cabbage) were the most potent inducers, but this was dependent on the var. Most of the extracts from fruits, with the exception of grapefruit, were poor inducers. Similarities and differences between the induction of GST and of quinone reductase in mouse hepa1c1c7 cells are discussed. The results show that extracts from cruciferous vegetables are effective inducers of human GST, in agreement with previous studies on GST in animals and cell lines derived from animals. AA

Apricots

123

Chauhan (SK). **Factors influencing the osmotic dehydration rate of wild apricot (chulli) fruit.** *Beverage and Food World* 25(5); 1998; 14-16

The study was conducted to evaluate the factors affecting the osmotically dehydrated apricot (chulli) fruit on osmotic rate at 40 , 50 , 60 and 70°C , sugar concn. of 60 , 65 , 70 and 75% for 3 h . Whole apricot fruit immersed in 1% NaOH as a pretreatment followed by osmodehydration in 70% sugar syrup at 50°C for 3 h gave the best results. The treated fruits was generally rated more acceptable. SRA

Oranges

124

Saini (HS), Singh (SN) and Saini (SPS). **Effect of micronutrient application on fruit drop and juice quality of kinnow.** *Beverage and Food World* 25(5); 1998; 26-29, 31

The mixture of micronutrient (Multiplex, Himplex and Tracel) formulations were applied at the rate of 0.5% on plants of medium vigour at Abonar and Hoshiarpur locations. The quality of kinnow fruit improved by the application of Multiplex at both locations. SRA

Peaches

125

Tijsskens (LMM), Rodis (PS), Hertog (MLATM), Kalantzi (U) and van Dijk (C). **Kinetics of polygalacturonase activity and firmness of peaches during storage.** *Journal of Food Engineering* 35(1); 1998; 111-126

The activity of endo-polygalacturonase (PG) in peaches during storage at different constant temp. is shown to be the result of a formation from some inactive predecessor and a denaturation or decay into an inactive form. This whole process strongly resembles the normally encountered turnover. On these premises, a process-oriented mathematical model is formulated. The variance accounted for by the model in multivariate nonlinear regression analysis is more than 80% for the data gathered in two successive seasons. Analysis of the data from both seasons combined did not decrease the descriptive power of the model, regardless the fact that the maturity at harvest and the initial level of enzyme activity showed major differences. The values of the parameters obtained from the data of both seasons combined were comparable with those of the individual seasons. The effect of the action of PG on the firmness of peaches was also modelled and analysed with an variance accounted for of almost 90%. The parameters obtained with respect to denaturation of the enzyme were highly comparable. AA

Sapota

126

Dengale (PS), Kute (LS) and Kadam (SS). **Influence of methods of extraction on recovery and quality of sapota pulp.** *Beverage and Food World* 25(5); 1998; 23, 24

The fully ripe fruits with firm texture and uniform maturity were used for the extraction of pulp using cold extraction ((CE) fruits were cleaned, cut into 4 pieces, skin and seed were separated and pieces were homogenised), hot process (HP) (fruits were heated to 80°C in water bath for 10 min and pulp was obtained as in CE) and enzyme process (EP) (cleaned fruits were cut into pieces, seeds were discarded, the pieces along with skin were incubated with 0.2% pectinase at 37°C for 6 h, and the skin was separated and pieces were homogenised to obtain pulp) methods. Among the methods used, the recovery of pulp was higher (82.3%) in EP method followed by HP. However, the quality of pulp was better in CE process with respect to consumer acceptance. SRA

CONFECTIONERY, STARCH AND SUGAR

Starch

127

Unlu (E) and Faller (JF). **Formation of resistant starch by a twin-screw extruder.** *Cereal Chemistry* 75(3); 1998; 346-350

The objective of this study was to evaluate the potential to increase the level of resistant starch (RS) in extruded products by optimizing extruder conditions. Three experiments were conducted as randomized complete block designs with 2 replicates. In the first experiment, corn starch, wheat starch, and potato starch were added at a level of 30% (w/w) to degerminated yellow corn meal to investigate the influence of starch type. In the second experiment, citric acid (CA) monohydrate was added to corn meal at levels of 0, 2.5, 5 and 7.5% (w/w). The third experiment was a full-factorial arrangement to evaluate the effect of high-amylose corn starch (HACS) level (0, 15, 30%, w/w) and CA level (0, 5, 7.5%, w/w) at two screw speeds (200 and 300 rpm). In the first experiment, the means for RS plus dietary fiber for the different starch formulations ranged from 1.27 to 2.28%. In experiment 2, adding CA increased RS plus dietary fiber content to a max. of 5.23% at 7.5% CA. In the third experiment, the means for RS plus dietary fiber ranged from a low of

1.75% for 100% corn meal at 300 rpm to 14.38% for 7.5% CA and 30% HACS at 200 rpm. The results indicated a highly significant positive relationship between CA and RS formation and the same for amylose content. The RS formation had a negative relationship with screw speed, but the influence of screw speed was small when compared with that of CA and HACS. AA

128

Knutson (CA). **Isolation of water-miscible high-oil fractions from starch-oil composites.** *Cereal Chemistry* 75(3); 1998; 351-353

High-oil fractions were isolated from a series of starch-oil composites prepared by jet-cooking mixtures of starch and vegetable oil in water. They consisted of an emulsion of starch, oil and water. These fractions were miscible in water and nearly immiscible in hexane. Emulsions from composites prepared with 10-40% oil contained 40-75% of the oil found in the original composite. Oil content of the emulsions varied with the oil content of the original composite, but the ratio of water to starch was essentially constant. AA

Sugar

129

Rastikian (K) and Capart (R). **Mathematical model of sugar dehydration during storage in a laboratory silo.** *Journal of Food Engineering* 35(4); 1998; 419-431

In the industrial processing of sugar beet, after drying and cooling, the sugar crystals are still likely to contain water. During storage in silos, the bound water on the crystal surface is changed into free water that enhances caking and the formation of lumps. Preventing caking requires a good knowledge of mass and heat transfer phenomena. To obtain this information, a laboratory silo was built and equipped out with thermohygrometers. Moreover, a model based on transient mass and heat balances was conceived which correlated well with experimental results (i.e. the temp. and humidity of air and the moisture content of sugar). Identification of certain parameters such as the mass transfer coefficient for sugar dehydration was thus possible. AA

Sugarcane

130

Lionnet (GRE). **A review of cane quality in South Africa and its effect on factory performance.** *Indian Sugar* 48(4); 1998; 235-247

Cane quality is important for factory performance and the quality of sugar. The article reviews some of the traditional quality criteria such as pol and fibre content of the cane and other less-used indicators and covers some relevant additional aspects of cane quality parameters which are available in the sophisticated and costly analytical systems in South Africa. SD

131

Ahmad (R), Qayyum (A) and Chaturvedi (CK). **Improved empirical formulae for evaluation of sugarcane quality.** *Indian Sugar* 48(3); 1998; 191-197

Based on juice extraction per unit cane, moisture per unit bagasse and °Brix and sucrose per unit juice, empirical formulae to estimate fibre per unit; sugar recovery percent cane and sugar or pol percent cane are developed. It is claimed to give more consistent estimations of the parameters than the existing empirical formulae. SD

BAKERY PRODUCTS

Biscuits

132

Maache-Rezzoug (Z), Bouvier (J-M), Allaf (K) and Patras (C). **Study of mixing in connection with the rheological properties of biscuit dough and dimensional characteristics of biscuits.** *Journal of Food Engineering* 35(1); 1998; 43-56

Impact of mixing time, and the role of pre-mixing of sugar and liquid ingredients were analyzed using deduced parameters of the mixograms such as instantaneous specific energy (ISE) and total specific energy (TSE). Rheological behaviour of the dough was determined by uniaxial compression at constant crosshead speed of 0.7 m/s; physical characteristics of the biscuits were also defined. Increasing mixing time resulted in the softening of dough, and reductions in both viscosity and

relaxation time. It also caused an increase in the length and reduction in the wt. of biscuits. The use of two protocols for mixing led to quite different doughs for the same formula. It was concluded that a dough has good consistency when it is mixed with standard protocol and becomes very softened when the liquid ingredients and sugar are pre-mixed. AA

133

Maache-Rezzoug (Z), Bouvier (J-M), Allaf (K) and Patras (C). **Effect of principal ingredients on rheological behaviour of biscuit dough and on quality of biscuits.** *Journal of Food Engineering* 35(1); 1998; 23-42

A specific study of the effect of three ingredients in biscuit dough (sugar, fat and water) and of the protein content of the flour has allowed the detn. of their respective effects on mixing, on the rheological behaviour, on biscuit size after cooking and on their mechanical properties. Addition of sugar to the formula decreases dough viscosity and relaxation time. It promotes biscuits length, and reduces their thickness and wt. Biscuits which are rich in sugar are characterized by a highly cohesive structure and a crisp texture. Addition of fat softens the dough and decreases the viscosity and relaxation time. Fat likewise contributes to an increase in length and to a reduction in thickness and wt. of biscuits, which are then characterized by a friable structure, easy to break. Increase in water leads to an significant decrease in the dough viscosity and a slight reduction of the relaxation time. The biscuits expand lengthwise, with a smaller thickness. Finally, varying the protein content of the flour from 14 to 20% induces major changes at the mixing stage in the rheological properties of the dough and in the dimensions and texture of the biscuits. AA

Bread

134

Myers (DK), Joseph (VM), Pehm (S), Galvagno (M) and Attfield (PV). **Loading of *Saccharomyces cerevisiae* with glycerol leads to enhanced fermentation in sweet bread doughs.** *Food Microbiology* 15(1); 1998; 51-58

Addition on exogenous glycerol to yeast coupled with a period of storage under refrigerated conditions allowed for influx of the polyol and equilibration of its intra- and extracellular concn. Glycerol-added yeast exhibited greater fermentation activity when

inoculated into sweet bread doughs than yeast to which no exogenous glycerol was added. This effect was found for all yeast strains investigated. Glycerol addition also resulted in significantly greater maintenance of the sweet dough fermentation activity of yeast when stored for up to three wks. at 4°C. Improvements were manifested when yeast were in aqueous or in compressed form. The effect of glycerol was dose- and equilibration-time dependent. AA

135

Lu (X) and Seib (PA). **Assay of dehydroascorbic acid in bread and dough added as a crystalline dimer.** *Cereal Chemistry* 75(2); 1998; 200-206

The assay of dehydro-L-ascorbic acid (DHAA) in dough and bread was done by reduction of DHAA to L-ascorbic acid (AA) in aqueous dithiothreitol (DTT) at pH 6-7 followed by quantitation of the AA using HPLC with electrochemical detection. At room temp. and pH 6.6, with 4.0 equivalents of DTT, the conversion of DHAA to AA was stoichiometric after 5 min. In mixograms on flour-water doughs, DHAA added in dimeric form at 200 ppm had no effect on absorption but increased mixing time by 9-19% with the same effects occurring in full-formula doughs. AA added to doughs did not affect mixing peak time or absorption. Mixing bread doughs with an initial level of 25-200 ppm of AA based on flour (14% mb) produced DHAA in the freshly mixed doughs at concn. of 20-51 ppm, or from 80 to 26% of AA added. During approx. 120 min of fermentation and proofing, the levels of AA in the doughs increased by 4-10 ppm. Mixing bread doughs with an initial level of 25-200 ppm of DHAA produced no AA in the freshly mixed doughs, but the proofed doughs and fresh breads contained 4-10 ppm and 7-49 ppm of AA, resp. Fresh bread made from dough with 200 ppm of AA retained 66% total vitamin C (110 ppm of AA + 21 ppm of DHAA), whereas bread made with 200 ppm of DHAA retained 9.5% total vitamin C (13 ppm of AA + 6 ppm of DHAA). DHAA was 2-4 times more effective in improving loaf vol. than an equal wt. of AA in no-time dough, and 1.5-2 times more effective in straight-dough. In straight-dough bread made with a commercial bread flour, increasing concn. of DHAA markedly improved bread up to approx. 20 ppm, beyond which overoxidation occurred rapidly. In contrast, increasing concn. of AA improved bread up to approx. 150 ppm with a broad tolerance up to 200 ppm. The improving action of DHAA was independent of the concn. of air in the

mixing bowl, and DHAA was much more heat-labile than AA. AA

136

Leuschner (RGK), O'Callaghan (MJA) and Arendt (EK). **Optimization of baking parameters of part-baked and rebaked Irish brown soda bread by evaluation of some quality characteristics.** *International Journal of Food Science and Technology* 32(6); 1997; 487-493

Part-baked Irish brown soda bread loaves with bicarbonate levels from 0 to 2.8% were baked, packed and stored for up to 11 days at 5°C then second-baked at 180 or 200°C for various times to give an oven-fresh end product. The quality of the rebaked bread was dependent on characteristics of the part-baked bread, its storage conditions and the processing parameters of the second baking phase. Quality parameters evaluated were bread vol., yield, crumb and crust firmness, moisture content and colour. Staling of the part-baked bread during storage at 5°C and reversion of this process at 59°C was investigated with regard to rebaking time and temp. Rebaking conditions were optimized by evaluating the core temp. increase in the centre of the bread. Immediately after the second baking phase a post-baking temp. increase was measured which allowed reduction of the in-oven rebaking time. The data were modelled mathematically using least squares analyses. AA

Noodles

137

Bejosano (FP) and Corke (H). **Effect of *Amaranthus* and buckwheat proteins on wheat dough properties and noodle quality.** *Cereal Chemistry* 75(2); 1998; 171-176

Isoelectric protein concentrates (IPC) were prepared from one buckwheat (*Fagopyrum esculentum*) and five *Amaranthus* genotypes. Their effect on the mixing properties of a wheat flour was studied. Mixograph and dynamic oscillatory measurements showed significant increases in dough strength with the addition of 2 and 4% IPC, correlated to the water-insoluble fraction level of the IPC. The same IPCs were used at 2% level to supplement a wheat flour in making Chinese dry noodles. Measurable changes in both the raw and cooked noodle colour were observed, and the change caused by addition of buckwheat IPC was substantial. Some of the IPCs

caused an increase in cooking loss and only one caused an increase in wt., while increase in vol. of the cooked noodles was not significantly affected. The changes in the rheological properties of cooked noodles due to addition of IPCs were measured. Overall, their effects were favourable, but the changes were statistically significant in only a few cases. The substantial dough-strengthening effect of the IPCs was hence not effectively translated into improved cooked noodle quality, and possible reasons for this are discussed. AA

Tortilla chips

138

Moreira (RG) and Barrufet (MA). **A new approach to describe oil absorption in fried foods: A simulation study.** *Journal of Food Engineering* 35(1); 1998; 1-22

The mechanism of oil absorption of tortilla chips during cooling was analyzed using capillary pressure theory. The experimental and theoretical results obtained with this mechanistic model agreed well. Computer simulations were made to determine the effect of different process conditions on the final product oil content. The results show higher oil content for tortilla chips with higher initial moisture content, smaller radius, lower cooling air temp., and higher interfacial tension. AA

MILK AND DAIRY PRODUCTS

139

Scheinbach (S). **Probiotics: Functionality and commercial status.** *Biotechnology Advances* 16(3); 1998; 581-608

Probiotics in the form of fermented milk products have been consumed for centuries. In this century various health benefits have been purported to result from consumption of foods containing live microorganisms, particularly lactic acid bacteria (LAB). Probiotics can provide relief for lactose intolerant individuals and reduce bouts of diarrhea. Evidence for other claims such as lowering serum cholesterol, suppressing cancer and stimulating the immune system remains to be clearly established by conducting well-controlled, statistically-valid clinical trials. Although the benefits to healthy individuals are uncertain, many consumers especially in Japan and

Europe, perceive probiotic products to be healthful, and sales are robust. AA

140

Sachdeva (S), Bhattacharjee (PP) and Singh (S). **Technology of lactose manufacture: A review.** *Indian Journal of Dairy Science* 51(1); 1998; 1-12

Basic steps involved in conventional lactose manufacture (deproteinisation of whey, concn., crystallisation and recovery of crystals) and the advances made in these processes are reviewed. The advent of membrane technology in whey processing for the manufacture of lactose and whey protein conc. is discussed. 64 references. SRA

141

Pattnaik (P), Ahmed (N), Grover (S) and Batish (VK). **Bioinformatics: The need of hour for R.** *Indian Dairyman* 50(8); 1998; 27-32

Bioinformatics, a new subject comprises of 2 interdisciplinary subjects viz the research and development works needed to build the information infrastructure required by modern biology and the computer based research devoted to understand basic biological questions. Principles underlying the subject and its application in dairy industry are highlighted. GS

Milk

142

Arora (S) and Rai (T). **Fatty acid profile and physicochemical properties of goat milk fat fractions.** *Indian Journal of Dairy Science* 51(1); 1998; 20-25

Goat milk fat was separated into solid and liquid fractions (LF) by crystallizing at 28°C and 24°C. The low melting or LF contained more of short chain and unsaturated fatty acids, whereas the high melting fractions contained more of long chain fatty acids. Size of crystals was larger in the fractions obtained at higher temp. than at lower temp. The solid fractions had a higher slip point than the liquid fat fractions. Temp. of fractionation greatly influenced the yield of milk fat fractions. The proportion of cholesterol, vitamin A and vitamin E were found to be higher in the LF whereas the solid fat fractions were richer in total phospholipids content. AA

143

Samolada (M); Litopoulou-Tzanetaki (E), Xanthopoulos (V) and Tzanetakis (N). **Changes in microbial flora during manufacture of a traditional fermented milk from ewe's milk.** *Food Microbiology* 15(1); 1998; 43-50

144

Prateek Jain, Sanjeev Kumar, Vivek Kumar and Gupta (SK). **Nutritional potentiality of Mare's milk.** *Indian Dairyman* 50(8); 1998; 39-42

The use of mare's milk which has high nutritional potential similar to human milk viz whey proteins 35-50%; unsaturated fatty acids 40 - 50%; low mineral content; high vitamin C, lysozyme and lactose percentage, is recommended for therapeutic uses and preparation of a fermented health drink 'Koumiss'. GS

145

Kansal (VK). **Milk offers dietary calcium in best available form.** *Indian Dairyman* 50(8); 1998; 23-26

Aspects considered in this article include are recommended dietary allowance (RDA) of Ca, and bioavailability of Ca from dairy foods. BV

146

Bector (BB) and Seema Rani. **A methodology to fortify low fat milk with vitamin A without using a homogenizer.** *Indian Journal of Dairy Science* 51(1); 1998; 69-72

The method involved the preparation of a water dispersible vitamin A emulsion which could be directly added to milk and mixed uniformly by physical means. Vitamin A content of fortified toned milk was significantly affected on boiling and sterilization and on exposure to sunlight and fluorescence light. The cost of fortification of TM with vitamin A at 2000 IU level was < 2 paise/l. SRA

Milk products

147

Jouppila (K) and Roos (YH). **Water sorption isotherms of freeze-dried milk products: Applicability of linear and non-linear regression analysis in modelling.** *International Journal of Food Science and Technology* 32(6); 1997; 459-471

Water sorption of various freeze-dried milk products was modelled using several water sorption isotherm models, most of which proved to be applicable. Sorption models were fitted to experimental data using linear and non-linear regression analysis. Both methods gave almost the same prediction of water sorption when the model had a good fit. The GAB model was considered to be the most applicable in predicting water sorption in practical applications, as the use of one universal model is desirable. Time-dependent changes, e.g. lactose crystallization above glass transition, were taken into account in the water sorption modelling. Water contents and RHs which allowed changes in physico-chemical properties were not included in the modelling, because of unsteady amounts of sorbed water. AA

148

Sharma (DK). **Ultrafiltration for manufacture of indigenous milk products: Channa and shrikhand.** *Indian Dairyman* 50(8); 1998; 33-37

'Shrikand' is a fermented and coagulated Indian milk product. It is popular as a dessert or pudding in western India. The intermediate product obtained by draining of dahi (curd) for preparation of 'Shrikand' is called chakka. Process to make quality 'Shrikand' by ultrafiltration channa (UF-channa) and UF - chakka is described. 'Channa' is an Indian 'heat acid' coagulated soft cheese. In traditional technology of channa-chakka making, the whey proteins with high BV, are drained out. Adopting UF, helps in recovery of whey proteins and in easy automative and process control for large scale production of these indigenous milk products. GS

Butter

149

Puranik (DB), Ramamurthy (MK) and Rao (HGR). **Comparison of quality of recombined milks prepared from butter oil and white butter.** *Beverage and Food World* 25(5); 1998; 30-31

In this study, an attempt was made to utilize white butter (WB) as a substitute for butter oil in the preparation of recombined milk (RCM) and the quality of RCMs prepared were compared with pure cow milk (CM). Study showed that uniformity in the composition of all the 3 type of milks was maintained except that a slightly higher acidity was noticed in RCM samples prepared by using skim milk powder

(SMP) and butter oil (RCM1). The overall acceptability score for RCM 1 was 7.0, where as rating for RCM prepared by using SMP and white butter was 8.0 (RCM2), which closely resembled the control sample. The TBA value for RCM1 samples increased with increase in the storage period significantly, whereas the values were marginal for RCM2 and CM. The RCM prepared with WB and SMP could be used as a substitute for CM during lean season. SRA

Ghee

150

Pruthi (TD) and Yadav (PL). **Preparation of phospholipids rich ghee.** *Indian Journal of Dairy Science* 51(1); 1998; 63-65

Addition of dipotassium hydrogen phosphate (DHP) to butter at 0.0, 0.1, 0.2, 0.5, 1.0 and 2.0% levels during ghee manufacturing at 115°C for no holding resulted in an av. release of 8.8, 9.9, 14.1, 29.0, 104.1 and 82.5 mg phospholipids resp. per 100 g ghee. It was concluded that with the addition of 1.0 g of DHP/100 g butter, phospholipids enriched ghee can be obtained with an expected induction period twice that obtained without addition of DHP. AA

Ice cream

151

Tirumalesha (A) and Jayaprakasha (HM). **Effect of admixture of spray dried whey protein concentrate and buttermilk powder on physicochemical and sensory characteristics of ice cream.** *Indian Journal of Dairy Science* 51(1); 1998; 13-19

Spray dried whey protein conc. (WPC) and sweet cream buttermilk powder (BMP) blended in 50:50 proportions were used in ice cream (IC) preparation by replacing skim milk solids at 25, 50, 75 and 100% levels. With the increase in the extent of replacement of skim milk solids with the admixture of BMP and WPC from 25 to 100%, there was slight decrease in freezing point, viscosity of the mix and melting resistance and hardness of the IC. Significant improvement in the whipping rate and overrun and the body and texture and overall acceptability scores was noticed with increasing the level of substitution. The IC prepared with complete replacement of skim milk solids with the admixture was adjudged to be superior to the control IC. AA

Serra cheese

152

Macedo (AC), Malcata (FX) and Oliveira (JC). **Effect of production factors and ripening conditions on the characteristics of Serra cheese.** *International Journal of Food Science and Technology* 32(6); 1997; 501-511

The individual and interactive effects of four production factors (amount of vegetable rennet, temp. of coagulation, pressing and salting of the fresh cheese) and two ripening factors (temp. and RH) on microbiological, physico-chemical, biochemical, textural and sensory characteristics of Serra cheese were simultaneously studied using 2^{6-1}_{VI} factorial design. Highly significant effects of salting and ripening RH upon the characteristics of the cheese were detected. Addition of salt to the surface of the fresh cheese reduced microbial growth, a_w , moisture and lactic acid contents, proteolysis, lipolysis, aroma and softness of the cheese. Conversely, increase of the RH during ripening increased these characteristics. Pressing had no statistically significant effect on cheese characteristics. AA

Yoghurts

153

Canganella (F), Ovidi (M), Paganini (S), Vettraino (AM), Bevilacqua (L), Trovatelli (LD). **Survival of undesirable microorganisms in fruit yoghurts during storage at different temperatures.** *Food Microbiology* 15(1); 1998; 71-77

The survival of *Yersinia enterocolitica*, *Escherichia coli*, *Rhodotorula mucilaginosa*, *Kluyveromyces marxianus* in fruit yoghurts after inoculation at 10^2 - 10^3 and 10^4 - 10^6 cfu/ml was investigated during storage at 4 and 8°C. The survival of *E. coli* in yoghurt was favoured at 4°C, whereas *Y. enterocolitica* survived longer at 8°C. The growth of *K. marxianus* was 10^2 to 10^5 - 10^6 cfu/ml during the 30 days storage. *R. mucilaginosa* showed an increase of 10-100 fold. Throughout the experiment, the counts for lactic streptococci were 10^8 - 10^9 cfu/ml and lactobacilli levels were 10^6 cfu/ml, and viability declined after 15 days of storage. With *Lactobacillus*, the inhibition of *E. coli* was very effective; no viable *E. coli* cells were detected after 24 h incubation. The *Streptococcus* strain was also able to inhibit *E. coli* but not so rapidly; slight growth of *E. coli* was

observed during the first 3 h, followed by a marked decrease in the number of cells. SRA

Milk proteins

154

Prasadarao (GVS), Lata Ramachandran, Singh (S) and Sharma (RS). **Standardization of pyne constant for estimation of buffalo milk proteins by formal titration.** *Indian Journal of Dairy Science* 51(1); 1998; 31-35

Farmal titre values of buffalo milk, casein and whey were determined without use of Ca ion chelator (T_1) and use of K oxalate (T_2) and tetrasodium pyrophosphate (T_3) as Ca ion chelators. The conversion factors were found to be different from those currently used and meant for cow milk analysis (1.70 w/w basis and 1.74 w/v basis for total protein by oxalate method of Pyne and 1.38 for casein as per BIS). Method T_1 can be used with reasonable accuracy and was found to be easier and more economical than methods T_2 and T_3 . AA

MEAT AND POULTRY,

Meat

Beef

155

Babji (AS), Alina (AR), Chempaka (MYS), Sharmini (T), Basker (R), Yap (SL). **Replacement of animal fat with fractionated and partially hydrogenated palm oil in beef burgers.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 327-332

Mutton

Sheep

156

Saxena (VB), Sharma (SP) and Jaiswal (PK). **A study on microbial load in salted sheep casings.** *Beverage and Food World* 25(5); 1998; 35

Seventy five samples of salted sheep casings were analysed for standard plate count, Staphylococcal count, coliforms, faecal coliforms and *Salmonella*. It

was observed that all the 75 samples of SSCs analysed, showed no Staphylococci, coliform, faecal coliform and *Salmonella* sp. The max. SPC was 4.0×10^4 , the min. was 1×10^1 and the av. count was 6.7×10^3 . Since these values are within the limits specified by ICMSF, the SSC are safe for consumption. SRA

Products

Sausages

157

Kotzekidou (P) and Bloukas (JG). **Microbial and sensory changes in vacuum-packed frankfurter-type sausage by *Lactobacillus alimentarius* and fate of inoculated *Salmonella enteritidis*.** *Food Microbiology* 15(1); 1998; 101-111

The ability of a commercial culture identified as *Lactobacillus alimentarius* inoculated as protective culture (PC) at levels of 1.6×10^3 and 1.6×10^5 cfu cm^{-2} of slice, to extend the shelf-life of sliced vacuum-packed (in pouches with O_2 transmission rate of $3.55 \times 10^{-3} \text{ cm}^3 \text{ m}^{-2} 24 \text{ h}^{-1} \text{ Pa}^{-1}$) frankfurter-type sausage (Pariza) during refrigeration ($6-8^\circ\text{C}$ and 52 and 42 days resp.) was investigated in comparison to control samples (23 days). The addition of PC increased lactic acid bacteria and suppressed other saprophytic microorganisms like pseudomonads and *Brochothrix thermosphacta*. Sliced Pariza, vacuum-packed with PC was acceptable upto 51 and 42 days when the level of inoculation was 1.6×10^3 and 1.6×10^5 cfu cm^{-2} of slice, resp., compared to control. The biopreservation system tested here could not guarantee the safety of vacuum-packed sliced Pariza when severe contamination with *Salmonella* occurs in this product. SRA

Poultry

158

Viljoen (BC), Geovnaras (I), Lamprecht (A) and von Holy (A). **Yeast populations associated with processed poultry.** *Food Microbiology* 15(1); 1998; 113-117

This study was conducted to identify predominant yeasts associated with the skin of fresh and spoiled processed poultry carcasses. Species of *Candida*, *Cryptococcus*, *Debaryomyces* and *Yarrowia* were

isolated from fresh and spoiled carcasses. *Rhodotorula* and *Saccharomyces* spp. were isolated from fresh samples and *Trichosporon* spp. from spoiled samples only. SRA

Chickens

159

Babji (AS), Chin (SY), Chempaka (MYS) and Alina (AR). **Quality of mechanically deboned chicken meat frankfurter incorporated with chicken skin.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 319-326

Four formulations were processed into frankfurters with different ratios of mechanically deboned chicken meat (MDCM) and cooked chicken skin (CCS) i.e., 80/0, 70/10, 60/20 and 50/30. The products were evaluated for proximate composition, cholesterol content, colour; 'L' value (lightness) and 'a' value (redness), percentage of cooking loss, physical measurements (shearforce-kgf and folding test), thiobarbituric acid value (TBA) and taste panel evaluation. The increment of CCS in the frankfurters increased the contents of moisture, ash, protein, fat, cholesterol, the lightness ('L' value) and redness ('a' value). After 3 months of frozen storage, the increment continued except for the moisture contents for formulations with 20 and 30% CCS. The lipid oxidation (TBA value) and cooking loss were lowered in formulations with CCS. After 3 months of frozen storage, TBA value decreased, while the cooking loss increased for all the formulations. The addition of CCS increased hardness of the frankfurters but affected folding ability, with formulation with 10% CCS scoring better grade. Sensory evaluation was carried out using 30 untrained panelists to evaluate aroma, colour, appearance, hardness, juiciness, chicken taste, oily taste, rancid taste and overall acceptance of the products. The addition of CCS in the frankfurters at 10 and 20% resulted in products with taste and texture that were acceptable after 3 months of frozen storage. AA

160

Saxena (VB), Sharma (SP) and Jaiswal (PK). **A study on the formulation of microbiological specification for dressed chicken.** *Beverage and Food World* 25(5); 1998; 36

Nineteen samples of dressed chickens were analysed for standard plate count (SPC), coliforms

and presence of *Salmonella*. Fifteen of the 19 samples showed SPC below 10^5 org/ml. Two samples showed 10^6 and another 2 samples showed 10^7 org/ml. Coliforms were more than 11,000 while (max.) min. were 90. *Salmonella* were not detected in any samples. All the samples were found to meet the suggested limits of ICMSF. Hence DC were found safe for consumption. SRA

SEAFOODS

161

Ohshima (T). **Recovery and use of nutraceutical products from marine resources.** *Food Technology* 52(6); 1998; 50-54

Discusses about a var. of marine by-products such as chitin, chitosan, fish oils, liquid crystal and protamines that have been successfully developed in Japan for use in nutraceutical products. CSA

162

Haard (NF). **Speciality enzymes from marine organisms.** *Food Technology* 52(7); 1998; 64-67

This article focusses on the genetic diversity and unique habitats of aquatic organisms, properties of some enzymes from aquatic organisms and their industrial applications. CSA

163

Molyneaux (M) and Lee (CM). **The U. S. market for marine nutraceutical products.** *Food Technology* 52(6); 1998; 56-57

Nutraceutical products from marine resources such as fish oils, shark cartilages, shark liver oil, chitin, chitosan etc. are expected to increase in number and in consumer interest because of its therapeutic values. CSA

Prawns

164

Chakrabarti (R) and Gupta (SS). **Studies on phenoloxidase activity and its sensitivity to metabisulphite in frozen *Metapenaeus monoceros*.** *Fishery Technology* 35(1); 1998; 30-33

The iced headless prawns (*Metapenaeus monoceros*) were washed thoroughly with water and divided into 3 lots. First lot was frozen in plate freezer at -40°C after adding 200 ml of cold glazing water without any further treatment. Second lot was dipped in 0.4% $\text{Na}_2\text{S}_2\text{O}_5$ sol. for 30s and the 3rd lot dipped in 0.5% $\text{Na}_2\text{S}_2\text{O}_5$ sol. for 30s. The treated prawns were stored in direct contact with crushed ice for 90 min, then frozen at -40°C . The blocks were packed in master cartons and stored at -18°C for 18 months. The stored samples were analysed at a regular intervals of 2 months to study the residual phenoloxidase activity (POA). The POA in the shell extract of prawn showed a decreasing trend during frozen storage at -18°C . The activity was lower in $\text{Na}_2\text{S}_2\text{O}_5$ treated samples. A dip in 0.5% $\text{Na}_2\text{S}_2\text{O}_5$ sol. for 30s controlled black spot in frozen prawns upto 10 months. This treatment did not show any adverse effect on biochemical and the sensory quality parameters. SRA

Shrimps

165

Kumar (P) and Bandyopadhyay (S). **Drying characteristics of shrimp head waste.** *Fishery Technology* 35(1); 1998; 26-29

The whole shrimp head waste and the head waste without shell were dried at dry bulb temp. of 50, 60 and 70°C , 40% RH and at 1.965 m/s drying air velocity. Results showed that the shell cover hindered the drying process considerably and the head waste without shell required less time to dry under a particular drying condition. There was no constant rate period during drying of samples without shell. Both constant and falling rate periods were observed in the whole head drying. Drying of both types of samples would be preferable at an air temp. of 70°C . SRA

Fish

Salmon

166

Jonsson (A), Paimadottir (H) and Kristbergsson (K). **Fatty acid composition in ocean-ranched Atlantic salmon (*Salmo salar*).** *International Journal of Food Science and Technology* 32(6); 1997; 547-551

The difference in fat content and fatty acid composition in the muscle of one- and two- year-old ocean-ranched Atlantic salmon (*Salmo salar*) was studied and compared using spot samples. The fat content in the muscle of 1-yr.-old salmon was 4.8% of wet wt., and 5.0% in 2-yr.-old salmon. The effect was not statistically significant. The main constituents of the fat were palmitic acid (16:0), oleic acid (18:1, n-9), gadoleic acid (20:1, n-9) and erucic acid (22:1, n-9). Eicosapentaenoic (EPA) and docosahexaenoic acid (DHA) were predominant among the polyunsaturated fatty acids (PUFAs). There was a significant difference between the groups in relation to the content of stearic acid (18:0), palmitoleic acid (16:1, n-9) and oleic acid (18:1, n-9). AA

Products

167

Lovegrove (JA), Brooks (CN), Murphy (MC), Gould (BJ) and Williams (CM). **Use of manufactured foods enriched with fish oils as a means of increasing long-chain n-3 polyunsaturated fatty acid intake.** *British Journal of Nutrition* 78(2); 1997; 223-236

PROTEIN FOODS

168

Cisse (D), Guiro (AT), Diaham (B), Souane (M), Doumbouya (NTS), Wade (S). **Effect of food processing on iron availability of African pearl millet weaning foods.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 375-381

The effects of different cereal precooking process (roasting and extrusion cooking) on Fe availability and protein digestibility of four African weaning foods were investigated using *in vitro* methods. In two weaning foods based on pearl millet, cowpea and peanut, the cereal was extruded (A) or roasted (B). In two other weaning foods having a similar composition, a low proportion of milk powder was added and the cereal extruded (C) or roasted (D). The mean plus or minus SD Fe values (mg/100 g) were: A, 5.56 plus or minus 0.18; B, 9.12 plus or minus 0.93; C, 5.89 plus or minus 0.23; D, 9.04 plus or minus 0.85. When the pearl millet was roasted, the Fe content was higher than in the extruded weaning foods ($P < 0.01$). However, the percent of available Fe of the roasted weaning foods was very

low (B, 1.64 plus or minus 0.01; D, 0.91 plus or minus 0.02). The Fe availability of the extruded weaning foods, A and C, was 3.5 times and 6.5 times higher than the corresponding roasted weaning foods, B and D, resp. This represented 332.4 plus or minus 4.4 and 375.1 plus or minus 5.8 µg of available Fe/100 g for A and C, resp. vs. 149.5 plus or minus 0.9 and 82.2 plus or minus 1.8 µg of available Fe/100 g for B and D, resp. No significant differences in polyphenol contents were found according to the precooking process of the cereal. The extruded weaning foods showed a higher protein digestibility of approx. 10% than the roasted ones ($P < 0.05$). A positive correlation was found between *in vitro* Fe availability and protein digestibility ($r = 0.976$, $P < 0.02$). Despite a high content of Fe, the Fe availability of roasted pearl millet weaning foods was quite low. Extrusion cooking of the cereal improved the protein digestibility and Fe availability of pearl millet weaning foods; however, the amount of available Fe remained insufficient to meet the Fe requirements of infants whatever the cereal processing. AA

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

169

Shayo (NB), Nnko (SAM), Gidamis (AB) and Dillon (VM). **Assessment of cyanogenic glucoside (cyanide) residues in Mbege: An opaque traditional Tanzanian beer.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 333-338

Wines

170

Honde (VM) and Adsule (RN). **Effect of different levels of sulphur dioxide and pH of the must on the chemical composition and sensory properties of sapota wine.** *Beverage and Food World* 25(5); 1998; 21-22, 24

The effect of 0, 50, 100 and 200 ppm SO₂ and 3.0, 3.5 and 4.0 levels of pH of the must on the chemical composition and sensory properties of sapota wine (SW) was studied. Results showed that the use of 100 ppm SO₂ and 4.0 pH of the must were the

optimum conditions for the preparation of good quality SW. SRA

Non-alcoholic beverages

Fruit juices

171

Ramos (AM) and Ibarz (A). **Density of juice and fruit puree as a function of soluble solids content and temperature.** *Journal of Food Engineering* 35(1); 1998; 57-63

A study of the effect of temp. and concn. of soluble solids on density of depectined and clarified peach juice and orange juice and a study of the effect of the temp. on density of apple and quince purees are reported. The densities of the peach and orange juices were determined at concn. of between 10 and 60°Brix and temp. of between 0 and 80°C. The densities of the apple and quince purees were determined within the same range of temp. For peach and orange juices the results were analyzed to obtain this property as a function of temp. and concn. and an equation describing the combined effect on density was proposed. For apple and quince purees the results were analyzed as a function of temp. and an equation describing this effect on density was proposed. All equations described were statistically significant at a confidence level of 95%. AA

Tea

172

Mazur (WM), Wahala (K), Rasku (S), Salakka (A), Hase (T), Adlercreutz (H). **Lignan and isoflavonoid concentrations in tea and coffee.** *British Journal of Nutrition* 79(1); 1998; 37-45

Tea is a beverage consumed widely throughout the world. The existence in tea of chemopreventing compounds possessing antimutagenic, anticarcinogenic and antioxidative properties has been reported. High intakes of tea and foods containing flavonoids have recently been shown to be negatively correlated to the occurrence of CHD. However, tea may contain other compounds with similar activities. Using a new GC-MS method lignans and isoflavonoids in samples of 20 commercial teas (black, green and red var.) were measured and, for comparison, 6 coffees. Both

unbrewed and brewed tea were investigated. The analysis of the teas yielded relatively high levels of the lignans secoisolariciresinol (5.6-28.9 mg/kg; 15.9-81.9 µmol/kg) and matairesinol (0.56-4.13 mg/kg; 1.6-11.5 µmol/kg) but only low levels of isoflavonoids. Because the plant lignans, as well as their mammalian metabolites enterolactone and enterodiol, have antioxidative properties and these mammalian lignans occur in high concn. in plasma. Study hypothesized that lignan polyphenols may contribute to the protective effect of tea on CHD. AA

FATS AND OILS

173

Hamilton (RJ), Kalu (C), Prisk (E), Padley (FB) and Pierce (H). **Chemistry of free radicals in lipids.** *Food Chemistry* 60(2); 1997; 193-199

A review of the chemistry of free radicals in lipids is presented. The keeping qualities of fish oil, sunflower oil and maize oil are studied with the peroxide value compared to their sensory evaluations. The levels of tocopherols in the three oils do not appear to account for their respective stabilities. Maize oil in the presence of fish oil remains unaffected by oxidation for lengthy periods. In attempting to obtain fractionation of the maize oil, a novel chromatographic medium was used which maintained the good keeping qualities of maize oil. 15 references. AA

174

Nagaraj (G). **Seed and oil quality of crambe genotypes - rich in erucic acid.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 17-18

Twelve genotypes (accessions) of Crambe obtained from U.S.A. were grown during Rabi season (1996-97). The seeds were evaluated for oil, protein and fatty acid composition. The oil content of the genotypes ranged between 30 and 35% with a mean value of 21.4% and protein content ranged from 23 to 26% in all the genotypes with a mean value of 24.2%. The major fatty acid was erucic (61.8%) followed by oleic acid (16.2%) and linoleic and linolenic acids (about 7% each). Most of the accessions had good seed and oil yield and hence have a good potential for utilisation as a source of high erucic acid oil by the industry. BV

Rao (BVSK), Vijayalakshmi (R), Kale (V) and Prasad (RBN). **Recent developments in oils, fats and allied products.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 31, 33, 35, 37, 39, 41, 43

Reviews covers the recent developments in oils, fats and allied products under the following headings: chemistry, analysis, biochemistry, technology, nutrition and surfactants. Articles and patents on these subjects are enlisted with short abstracts. GS

Fats

176

Kilara (A). **Fats and fat substitutes.** *Indian Dairyman* 50(8); 1998; 7-15

The types and uses of fat 'substitutes'/'mimetics' are examined considering the problems and opportunities for reduced fat foods. Mimetics based on starch, protein, complex carbohydrates and synthetic fat are reviewed. These fat mimetics are not found to be ideal as fat substitute. GS

177

Vandana Sharma, Sumit Arora and Rai (T). **Fat replacers.** *Indian Food Industry* 17(2); 1998; 89-97

Fat replacers are ingredients used to replace the fat in a food system. Types of fat replacers (fat substitutes, fat mimetics, bulking agents), carbohydrate-based fat replacers (food gums, cellulose gel, starch derivatives, maltodextrins, potato starch maltodextrin, properties of potato starch maltodextrin (polydextrose, corn starch maltodextrin, tapioca maltodextrin, oat maltodextrin), modified food starches, other carbohydrate-based fat replacers (inulin, pectin, hemicellulose), protein-based fat substitutes (casein-based fat substitute, whey protein-based fat substitute, plant protein-based fat substitute), synthetic fat substitute (sucrose polyester, esterified propoxylated glycerol (EPG), polyglycerol esters, polysiloxane, dialkyldihexadecylmalonate (DDM), trialkoxytricarballate (TATCA), trialkoxycitrate (TAC), medium chain triglycerides (MCTs)) and combination of products are the various aspects dealt in this article. CSA

Oils

178

Ghosh (S), De (BK), Bhattacharyya (DK) and Bandhu (C). **Lipase hydrolysis of some minor oils.** *Seafood Export Journal* 30(1); 1998; 19-21

Some of the minor oils of wheat germ (*Triticum*), rice bran (*Oryza sativa*), mowrah (*Madhuca latifolia*), mango kernel fat (*Mangifera indica*), karanja (*Pongamia glabra*), nahor (*Mesua ferra* Linn.), bantulsi (*Ocimum gratissimum* Linn.) marda (*Terminalia arjuna*) are hydrolysed by stirring at 30°C plus or minus 2°C with 0.2% (w/w) *Candida cylindracea* lipase powder and 100% water. The oils are almost completely hydrolysed within 48 h. AA

179

Tewfik (IHM), Ismail (HM) and Sumar (S). **The effect of intermittent heating on some chemical parameters of refined oils used in Egypt: A public health nutrition concern.** *International Journal of Food Sciences and Nutrition* 49(5); 1998; 339-342

Various chemical parameters (CPS) of oil which are considered good indices in assessing the degree of thermal abuse, oxidation and overall quality (acid values, iodine values, peroxide values) were studied with respect to different frying oils. Results show that the oil most commonly used by street vendors (blend of cotton seed and sunflower oil) is the least suitable for frying, while palm oil on the basis of various CPS studies, is the ideal choice. However, from the nutritional and public health stand point, the use of saturated oils is to be discouraged. Corn oil is therefore the next best choice from both the chemical and nutritional stand point, and is recommended for public use in a country in which deep-fried vegetable patties ('fallafel') forms the staple food item in the diet. SRA

180

Bhattacharyya (S), Bhattacharyya (DK) and Sengupta (R). **The use of biorefined oil in margarine formulation.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 14-16

Study reports the suitability of utilising monoglycerides (MG) in biorefined oils produced during enzymatic deacidification of rice bran oil

(RBO) to produce stable emulsions in margarine formulations. RBO (free fatty acids (FFA) 20.7%) on enzymatic deacidification yielded neutral oil (FFA 2.3%, MG 0.6%). Results indicate that considerable amount of diglycerides (approx. 10%) produced in deacidification reaction also stabilises the emulsion. Margarine prepared with biorefined oil containing approx. 0.6% MG from stable emulsion which is more or less stable up to the melting point of fat blends of margarine. Thus biorefined oil may replace the addition of MG in margarine formulation. BV

181

Nasirullah, Saramandal (CV) and Gopalkrishna (AG). **Changes in repeatedly heated oils during deep fat frying.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 10-13

To assess the stability of oils during repeated frying, refined groundnut oil, ((A) raw groundnut oil (GO) (B) and RGO blended with raw sesame oil (SO) in the ratio 3:1 v/v (C) which were used for deep frying at regular intervals) were investigated. The oils were examined for % mono-, di-, and tri-glyceride, % free fatty acids, UV spectrum (UVS) of triglycerides (Tg), diglycerides (Dg) and mono-glycerides (Mg) at regular intervals. Glyceride composition revealed that as frying progressed, degradation of Tg increased. The values for Tg for samples A, B and C were found to be between 93.0 to 79.1, 93.2 to 79.6 and 93.0 to 80% respectively. Effect of natural antioxidants like tocopherols and sesamol present in Go and So were studied. No significant change in free fatty acids content was noticed. UVS of Tg and mixture of Dg and Mg showed a strong absorption at 242nm and a weak absorption at 270nm indicating the likely presence of conjugated ene-one system generated after deep frying. Incorporation of So in RGO retarded the progress of oxidation. AA

182

Ghosh (S), Bhattacharyya (DK) and Dey (P). **Acid oils as raw materials for biodiesel.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 8-9

The distilled methyl esters obtained from 5 acid oils of commerce, coconut, sunflower, soybean, mustard and rice bran were evaluated as a raw material for the production of diesel-fuel substitute. The obtained methyl esters having cetane index ranging from 48.3 to 65.2 and heat of combustion ranging from 38.3 to

40.3 KJ/g had properties as per the proposed ASTM standard for biodiesel. AA

183

Tyagi (VK), Vasishtha (AK) and Sinha (S). **Evaluation of frying oils in deep-fat frying.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 3-7

Refined, bleached and deodorized soybean oil and its blends (80:20) with raw mustard and sesame oil were subjected to deep-fat frying of potato chips at 180°C for 36 h. The analytical data of oil samples drawn periodically revealed that refractive index, colour, sp. gr., free fatty acid and conjugated dienes increased with frying time whereas iodine value decreased. Loss of fatty acids during frying were found in the range of 14.2-31.5% and were highest in soybean oil. The deterioration in soybean oil was much faster as compared to the other 2 blends; however the blend of soybean oil plus mustard oil showed higher stability. Similar observations were also made during static heating of soybean oil. AA

SPICES AND CONDIMENTS

Condiments

184

Peressini (D), Sensidoni (A) and de Cindio (B). **Rheological characterization of traditional and light mayonnaises.** *Journal of Food Engineering* 35(4); 1998; 409-417

Mayonnaises are oil in water emulsions with a texture that is particularly appreciated by consumers. The actual nutritional trend towards low-calorie foods has increased the interest in fat substitutes without altering the consistency of the product. From this point of view rheological properties may give a quantitative contribution to texture characterization and control when using different formulations. The rheological approach has been applied to typical commercial normal and light mayonnaises with a fat content ranging from 76 to 48%. These materials have shown a viscoelastic behaviour that was measured by means of both oscillatory and creep-recovery tests. The storage modulus, the compliance and the yield stress were found to increase when increasing the fat content. A modified Bolhin theory was used to relate structural

parameters to rheological dynamical measurements. Thus the emulsion stability was quantified by means of a pseudoplastic-coordination number (z) and the value of G' at 1 Hz. From the creep test the value of the yield stress was determined and in the case of the light mayonnaise was very close to a normal emulsion whereas the corresponding viscoelastic properties were very different. This implies that to reproduce an assumed texture, it is necessary to perform all the tests outlined. AA

Essential oils

185

Mosciano (G). **Organoleptic characteristics of flavour materials.** *Perfumer and Flavourist* 23(4); 1998; 33-35

This is a series of articles reporting on reviews of flavour materials. 2-acetoxy-2-butanone, angelique racines N. essence, baies rose extract, benzyl butyrate natural, blood orange extract of blueberry powder natural, damascenone natural 23%, dodecanal natural, formic acid natural, ginseng Siberian extract, grape fruit extract of whole pink, green tea extract, lemon essence oil phase ex. Argentina, lime tahitian 8-fold, mandarin extract of whole, methyl mercaptan natural, orange, extract of whole extract, orange flower abs., and 4-terpineol natural are the flavour materials covered. SRA

186

Lawrence (BM). **Progress in essential oils.** *Perfumer and Flavourist* 23(4); 1998; 37-40, 42-44, 46-50

Celery seed oil, lemon grass oil, anise oil, buchu leaf oil are covered. Comparative chemical composition of these oils are tabulated. SRA

187

Lawrence (BM). **Progress in essential oils.** *Perfumer and Flavourist* 23(5); 1998; 55-68

Helichrysum oil and extract, lemon verbena oil, agarwood oil, cedarwood oil are covered under the topic. Percentage composition, structures of compounds of these oils are tabulated. SRA

Spices

188

Menon (KPG). **Export prospects of value added spices.** *Beverage and Food World* 25(5); 1998; 18-20

189

Aruoma (OI), Spencer (JPE), Warren (D), Jenner (P), Butler (J), Halliwell (B). **Characterization of food antioxidants, illustrated using commercial garlic and ginger preparations.** *Food Chemistry* 60(2); 1997; 149-156

Methods for the characterization of antioxidants are presented and illustrated by their application to commercial garlic and ginger preparations, since it has been widely speculated that garlic and ginger might be beneficial to human health because they exert 'antioxidant activity'. The sample of commercial ginger powder, tested at concn. up to 5 mg/ml, inhibited the peroxidation of phospholipid liposomes, but a sample of one commercial garlic preparation was less effective. Both preparations could scavenge peroxy radicals, but the garlic preparation was again less effective. The ginger and garlic preparations were powerful scavengers of hydroxyl radicals (OH^\cdot) and were able to react with hypochlorous acid ($HOCl$) at a rate sufficient to protect catalase and α -1-antiproteinase against inactivation. However, they could also interact with Fe chelates to facilitate OH^\cdot generation from H_2O_2 ('pro-oxidant' activity). Ginger (but not the garlic preparation) also exerted pro-oxidant action in the bleomycin assay, accelerating damage to DNA in the presence of a bleomycin-ferric Fe complex. Results illustrate the use of antioxidant characterization methods. AA

190

Mosciano (G). **Organoleptic characteristics of flavour materials.** *Perfumer and Flavourist* 23(5); 1998; 49-52

This is a series of articles reporting on reviews of flavour materials. Butyl isobutyrate (natural), cassia extract pure, trans-2-Decenal (natural), dimethyl sulphide (natural), ethone, ethyl-2-hydroxy-cyclopenten-1-one, ethyl pelargonate (natural), furfuryldisulphide (natural), geranyl propionate (natural), 2-hydroxy acetophenone, isoamyl laurate, lemon esters (natural), monomentholsuccinate, 3-octanol, orange oil

valencia 10 fold, oranger Italie G. N. super absolute, phenylacetaldehyde (natural), tetrahydrofurfuryl propionate and 3,5,5-trimethyl-1-hexanol flavouring materials are included. SRA

Mentha

191

Ravid (U). **Enantiomeric distribution of oxygenated monoterpenes in some *Mentha* essential oils.** *Perfumer and Flavourist* 23(4); 1998; 25-30

In this study, the chiral oxygenated monoterpenes, which are the predominant and most valuable monoterpenes in *Mentha* oils was analyzed. This technique enables to determine the enantiomeric purities of other components in the oils, such as monoterpene hydrocarbons and sesquiterpenes. Study indicated that capillary GC on optically active modified cyclodextrin phases is a highly sensitive method for enantiomeric analysis of chiral volatile compounds in mint oils (MOs) and in other essential oils. The enantiomeric ratio of MO components is a reliable parameter to assess quality because it may be indicative of adulteration, contamination, aging, shelf life, technological process and botanic source of the specific chiral compound. SRA

Pepper

192

Kojima (H), Kato (A), Kubota (K) and Kobayashi (A). **Aroma compounds in the leaves of Japanese pepper (*Zanthoxylum piperium* DC) and their formation from glycosides.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 491-494

SENSORY EVALUATION

193

McEwan (JA). **Harmonizing sensory evaluation internationally.** *Food Technology* 52(4); 1998; 52-56

A European Sensory and Consumer study on coffee demonstrates that sensory attributes used by a trained panel in one country can be used to understand consumer preferences in other countries. CSA

194

Shallenberger (RS). **Sweetness theory and its application in the food industry.** *Food Technology* 52(7); 1998; 72-76

The article discusses that understanding the chemical nature of sweetness can help guide food technologists in development and improvement of food products. CSA

195

Ennis (DM). **Foundations of sensory science and a vision for the future.** *Food Technology* 52(7); 1998; 78-85

Understanding mol. and perceptual processes for the future development of sensory science as a field and to explain why is the main purpose of this article. Practical issues in sensory evaluation, structure and relationships, models influenced by mathematical psychology - Thurstonian model, models influenced by pharmacokinetics, models influenced by biostatistics and the future of sensory science are the various aspects dealt. CSA

196

Hassan (BH) and Hobani (AI). **Flow properties of Roselle (*Hibiscus sabdariffa* L.) extract.** *Journal of Food Engineering* 35(4); 1998; 459-470

Flow properties of water extract of *Roselle calyces* were determined using a concentric cylinders rotational viscometer for extract concn. range of 5-65% TS, temp. range of 20-60°C, and shear rate range of 2.5-979 s⁻¹. Measured shear stress was within the range 0.5 to 49.7 Pa, corresponding to an apparent viscosity range of 0.0015-1.55 Pa s. Within the tested ranges of concn., temp., and shear rate, the extract exhibited a pseudoplastic behaviour, and was adequately described by the simple power law model. The flow behaviour index was consistently below unity (0.76-0.97), with the consistency index varying between 0.007 and 1.6 Pa sⁿ. Activation energy of flow varied from 18.74 to 42.80 (kJ/kmol) for the extract concn. range of 5-65% TS, at a shear rate of 100 s⁻¹. The experimental results were fitted by mathematical models to allow prediction of apparent viscosity as a function of concn., temp. and shear rate. AA

Rousset-Akrim (S), Martin (J-F), Bayle (M-C) and Berdague (J-L). **Comparison between an odour profile and a flavour profile of dry fermented sausages.** *International Journal of Food Science and Technology* 32(6); 1997; 539-546

Two preparations of dry fermented sausage inoculated with one of four different strains of *Staphylococcus* were prepared a wk. apart and tested twice by 10 trained assessors. Profiles of eight attributes (vinegar, dry sausage, fat, dry cured-ham, pate, milk, butter and nutty) were monadically assessed twice and scored on non-structured scales. During the first two sessions subjects tasted twice the four dry sausages from both preparations, and during the last two sessions 7 days later they assessed the odour of the same samples in duplicate by sparging with air. Principal component analysis showed that the eight samples (four strains x two preparations) of dry sausage were described similarly by tasting and sniffing except for the fat attribute. The principal component analysis showed that the eight samples of dry sausage were better discriminated by smell than by taste. This smelling procedure resulted in a better recognition of dry sausages inoculated with the same strain of *Staphylococcus* than that by tasting. Variance analysis showed that product effect was significant on common odour and flavour attributes: 'vinegar', 'fat' and 'butter', and it was never significant on 'nutty' and 'pate'. The F-values for 'vinegar', 'fat', 'dry ham', 'milk' and 'butter' were higher by smell than by taste. Only 'dry-sausage' was better distinguished by taste. AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

198

Kanauchi (O), Nakamura (T), Agata (K) and Fushiki (T). **Preventive effect of germinated barley**

foodstuff on diarrhea induced by water-soluble dietary fiber in rats. *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 449-454

199

Kaku (S), Yamada (K), Hassan (N), Watanabe (T) and Sugano (M). **Effect of vegetable extracts on immunoglobulin production by mesenteric lymph node lymphocytes of Sprague-Dawley rats.** *Bioscience, Biotechnology and Biochemistry* 61(3); 1997; 558-560

200

Garcia (DJ). **Omega-3 long-chain PUFA nutraceuticals.** *Food Technology* 52(6); 1998; 44-49

The article discusses that enrichment of everyday food products with ω -3 long-chain polyunsaturated fatty acids is a major opportunity for food and beverage manufacturers, but taste and cost are important considerations. CSA

201

Ruxton (CHS) and Kirk (TR). **Breakfast: A review of associations with measures of dietary intake, physiology and biochemistry.** *British Journal of Nutrition* 78(2); 1997; 199-213

The present paper reviews the literature on breakfast to consider reported associations between breakfast and nutritional, physiological and biochemical variables. The contribution of breakfast to achieving nutrition targets for fat, carbohydrate and dietary fibre intakes is also examined as are the potential effects of fortified breakfast cereals on intakes of micronutrients and nutritional status. Breakfast consumption, particularly if the meal includes a breakfast cereal, is associated with lower intakes of fat and higher intakes of carbohydrate, dietary fibre and certain micronutrients. These findings may be relevant to population groups which could be at risk from low intakes of certain micronutrients, but further clarification of benefit is needed from studies of nutritional status. Associations between breakfast consumption and lower cholesterol levels have been reported, while lower body wt. have been seen amongst breakfast eaters. It is concluded that breakfast consumption is a marker for an appropriate dietary pattern in terms of both macro- and micronutrients, particularly if breakfast cereals are included in the meal. 87 references. AA

Mathew (PT) and Ramachandran Nair (KG). **Hypocholesterolemic effect of chitin and its hydrolysed products in albino rats.** *Fishery Technology* 35(1); 1998; 46-49

Male albino rats of wistar strain were fed diets supplemented with chitin, partially hydrolysed chitin (PHC and glucosamine hydrochloride (0.5% of the diet) for 13 wks. After 13 wks. the animals were killed and the muscle, kidney and heart were dissected. These organs were tested for their total cholesterol content. Digestibility of chitin, PHC and glucosamine hydrochloride absorption were determined. Results showed that the diets did not affect the growth rate significantly. Cholesterol levels were significantly low in all 3 experimental groups. It was more pronounced in the chitin (217.6 plus or minus 11.52 mg/100 g in liver, 363.7 plus or minus 29.30 mg/100 g in kidney, 85.9 plus or minus 4.15 mg/100 g in muscle, 153.9 plus or minus 7.26 mg/100 g in heart and 55.4 plus or minus 0.54 mg/100 ml in serum) and PHC (242.3 plus or minus 39.30 mg/100 g in liver, 334.8 plus or minus 25.17 mg/100 g in kidney, 73.5 plus or minus 5.51 mg/100 g in muscle, 179.6 plus or minus 17.28 mg/100 g in heart and 60.9 plus or minus 0.04 mg/100 ml in serum) fed groups. Differences in digestibility of chitin and derivatives were not significant. SRA

203

Dalais (FS), Wahlqvist (ML) and Rice (GE). **Phytoestrogens-health significance and the food industry.** *Food Australia* 50(10); 1998; 494-495

Analyses of new high phytoestrogen (estrogen-like plant compounds classified in 3 main categories: isoflavones, coumestans and lignans) foods indicate that there is significant variation between food products as well as variation within the same product. If food companies are to use phytoestrogen

concn. as a marketing strategy, a high quality control program for regular isoflavone analysis is warranted with a relevance to the Australian food industry. SRA

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

204

Madhavan (A). **Government policies on vegetable oils and fats: Recent changes.** *Journal of the Oil Technologists Association of India* 30(1); 1998; 27, 29

Rules and regulations regarding vegetable oils and fats; and relaxation of restrictions on the usage of individual oils in vanaspati, as a part of the ongoing liberalisation policy of the Government of India are highlighted. GS

205

Dunn (AJ). **Developments in European Union legislation on food preservatives.** *Food Chemistry* 60(2); 1997; 187-191

206

Hutt (PB). **A guide to the FDA modernization act of 1997.** *Food Technology* 52(5); 1998; 54-60

A detailed analysis of the legislation that will require major change in FDA policy and practice is discussed. CSA

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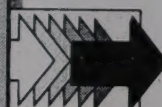


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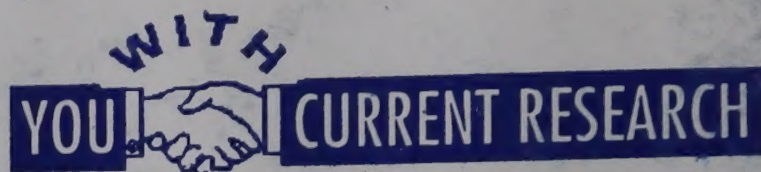
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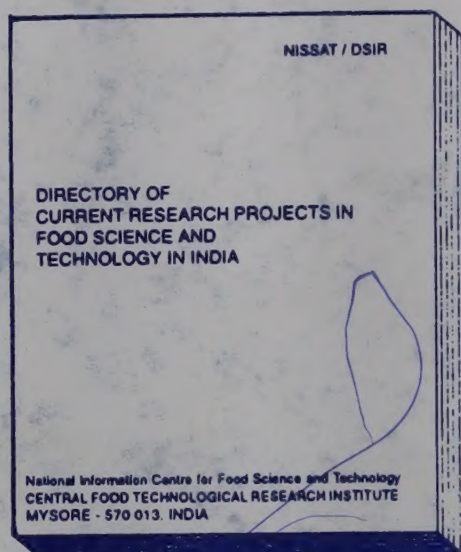
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